A PRELIMINARY REVISION OF THE GENUS *OXYA* AUDINET-SERVILLE (ORTHOPTERA : ACRIDOIDEA)

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CONTENTS

SYNOPSIS

The genus *Oxya* is redescribed and defined; keys are given to the 18 species and six subspecies included in the genus. Two of the species are described as new and the remainder are redefined; 24 new synonyms are proposed, and a junior synonym is removed from the genus.

INTRODUCTION

Species of the genus *Oxya* are widely known to be pests of rice, sugar cane and other crops, from Pakistan, throughout the Oriental region, China, S. E. Russia, the Australian region, and the genus was introduced to Hawaii last century. The insects are well adapted to the marshy conditions in which they live as the hind tibia and tarsus are expanded and 'oar-like', enabling the insect to swim (Uvarov, 1928: 319); the female is able to oviposit in soil in drier conditions and, in flooded fields, to cement egg-masses between grass stems, in leaf axils or on stones, an inch or two above the water-level.

The systematic state of the genus was in such disarray that it has been almost impossible to identify specimens with stable names or, in many cases, to separate one species from another. The need became obvious for some form of revisionary work and this was undertaken.

During the course of preliminary investigations two important points emerged, these being that the species at present included in the genus are not sufficiently similar in their male phallic complex morphology to be of monophyletic origin, and that the scope and definition of the whole subfamily Oxyinae would have to be reassessed. These points presented a practical dilemma, in that a comprehensive revision of the genus *Oxya* would involve a lengthy study of all the genera included

in the subfamily. The economic entomologists, however, required a more immediate means of identifying *Oxya* species with an element of stability. The following course of action was therefore adopted. The genus *Oxya* was to be treated as a taxonomic entity with the species diagnosed, their synonymy clarified and keys erected for purposes of identification. The interrelationships of the species are briefly discussed but any decisions on the 'naturalness' of the genus and its position within the subfamily Oxyinae are deferred to a later paper.

The genus was last revised by the late C. Willemse (1925) and he recognized thirty species. History prior to his revision need not be quoted here. Uvarov (1926) published a few minor corrections to Willemse's revision, synonymized three of the species that Willemse recognized, added three more species which Willemse omitted (as he was unable to make type-examinations) and altered some points of nomenclature. Since then a further 11 species and three subspecies have been added; of the former, two have been sunk into synonymy, and of the latter, one has been given full specific status and another synonymized. Thus up to now the genus was thought to contain forty species and one subspecies.

A basic fault in Willemse's revision was his misapplication or exclusion of the names *Gryllus velox* Fabricius, *Gryllus japonicus* Thunberg and *Gryllus chinensis* Thunberg, and this arose because the relevant type-specimens were not examined or were interpreted incorrectly. Authors following Willemse, e.g., Chang (1934), Tinkham (1940) and Mishchenko (1951 and 1952), accepted his interpretations with slight deviations and consequently the systematic and economic literature on the genus has become extremely confused. Where an author has added a description to a reported name, the species he was dealing with can normally be identified and these references are now added in the synonymy lists below. Unfortunately many of these records are in name only, making positive identification impossible.

During the course of this work all the available types of *Oxya* species were studied, but if a type was unavailable this is stated. Lectotypes have been designated where appropriate. In two cases, *O. yezoensis* Shiraki and *O. hyla* Serville, it has been reliably ascertained that the types are irretrievably lost and, as nomenclatorial problems could arise and have arisen, neotypes are erected.

It is suggested here that the genus contains 18 species, two of which are described as new and a further three are each divided into two subspecies. The recognized species and subspecies are diagnosed, their synonymy stated and distribution quoted only from material to hand, as many previous records are doubtful owing to misidentification and misapplication of names. The synonymy given under each species includes all primary synonymy and combinations, references where the original author's interpretation is known or deduced, and biological references again only where the specific interpretation is known.

Type-depositories are given in abbreviated form as follows:

MNHU, Berlin – Museum für Naturkunde der Humboldt-Universität, Berlin.

BMNH – British Museum (Natural History), London.

UZM, Copenhagen – Universitetets Zoologiske Museum, Copenhagen.

DEI, Eberswalde – Deutsches Entomologisches Institute, Eberswalde, DDR.
MHN, Geneva – Muséum d'Histoire Naturelle, Geneva.
RNH, Leiden – Rijksmuseum van Natuurlijke Historie, Leiden.
ZI, Leningrad – Zoological Institute, Academy of Sciences of USSR, Leningrad.
NM, Maastricht – Natuurhistorisch Museum, Maastricht.
MNHN, Paris – Muséum d'Histoire Naturelle, Paris.
ZIHU, Sapporo – Zoological Institute, Hokkaido University, Sapporo.
NR, Stockholm – Naturhistoriska Rijksmuseum, Stockholm.
ZIUU, Uppsala – Zoologiska Institutonen, Uppsala.
NM, Vienna – Naturhistorisches Museum, Vienna.
coll. Willemse – Dr F. Willemse, Eygelshoven, Laurastraat 67, Netherlands.

Measurements and abbreviations of measurements in the work follow those of Dirsh (1953). The figures given for the ranges of measurements are based on a deliberate choice of the largest and smallest specimens that could be found in the available material. The ratios of measurements given for each species are based on samples of thirty specimens of each sex, or less if fewer were available, but these samples included the largest and smallest specimens measured and therefore were not entirely random.

Abbreviations used in the figures of the male phallic complex (mostly as in Dirsh, 1956*a*) are:

A	ancorae of epiphallus	Ejs	ejaculatory sac
Ac	arch of cingulum	Gpr	gonopore process
Anp	anterior process of epiphallus	Il	inner lophus of epiphallus
Ap	apical valve of penis	Lfl	lateral fleshy lobe of cingulum
Apd	apodeme of cingulum	Ol	outer lophus of epiphallus
B	bridge of epiphallus	Os	oval sclerite of epiphallus
Bp	basal valve of penis	Pp	posterior process of epiphallus
Cv	cingular valve	Ppc	posterior process of cingulum
Ectm	ectophallic membrane	Rm	ramus of cingulum
Ects	ectophallic sheath	Sps	spermatophore sac
Ejd	ejaculatory duct	Vpc	valvular plate of cingulum

I take this opportunity to thank the Keeper of Entomology, British Museum (Natural History) for allowing me to study the material in his care; Dr N. D. Jago for criticising the typescript; and the following colleagues for lending type and other material for study: Professor Max Beier, Vienna; Dr M. Descamps, Paris; Dr P. H. van Doesburg, Leiden; Dr N. Fukuhara, Tokyo; Dr K. K. Günther, Berlin; Dr B. Hauser, Geneva; Dr L. Hedström, Uppsala; Dr N. D. Jago, formerly of Philadelphia; Dr C. A. W. Jeekel, Amsterdam; Dr P. I. Persson, Stockholm; Dr B. Petersen, Eberswalde, DDR; Professor R. E. Pfadt, Laramie; Monsieur R. Roy, Dakar; and Dr T. Yamasaki, Tokyo.

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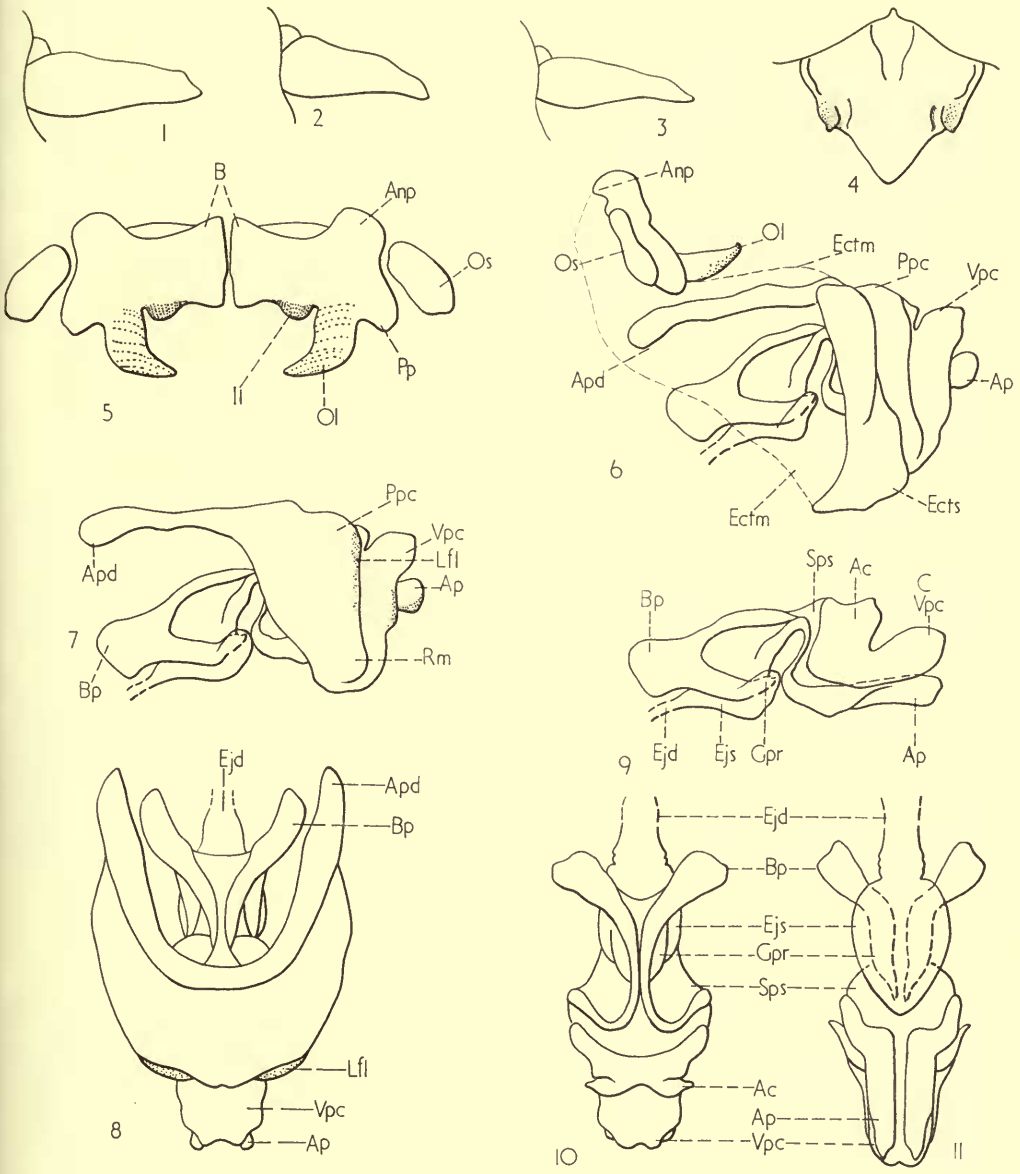
TAXONOMIC TREATMENT

OXYA Audinet-Serville, 1831

Oxya Audinet-Serville, 1831: 286. Type-species: *Oxya hyla* Audinet-Serville, by monotypy.
Oxya Audinet-Serville; Burmeister, 1838: 634, partim.
Acridium (*Oxya*) Audinet-Serville, 1839: 678, pl. 12, fig. 4.
Oxya Audinet-Serville; de Haan, 1842: 155, partim.
Oxya Audinet-Serville; Stål, 1873: 81.
Oxya Audinet-Serville; Brunner von Wattenwyl, 1893: 151.
Oxya Audinet-Serville; Kirby, 1910: 393, partim.
Oxya Audinet-Serville; Kirby, 1914: 198.
Oxya Audinet-Serville; I. Bolívar, 1918: 14.
Oxya Audinet-Serville; Sjöstedt, 1921: 92.
Oxya Audinet-Serville; Willemse, 1925: 8.
Oxya Audinet-Serville; Uvarov, 1926: 45.
Oxya Audinet-Serville; Willemse, 1930: 119.
Oxya Audinet-Serville; Willemse, 1931: 236.
Oxya Audinet-Serville: Sjöstedt, 1935; 71.
Oxya Audinet-Serville; Tinkham, 1940: 291.
Oxya Audinet-Serville; Mishchenko, 1951 : 163.
Oxya Audinet-Serville; Mishchenko, 1952: 139.
Oxya Audinet-Serville; Willemse, 1955: 142.
Oxya Audinet-Serville; Johnston, 1956: 250, partim.
Oxya Audinet-Serville; Johnston, 1968: 172.

Description. Medium size. Integument usually finely rugulose and shiny but in one species more coarsely rugulose and matt. Fastigium of vertex, from above, short, with widely rounded or obtuse apex, with shallow longitudinal concavity and without median longitudinal carinula. Antenna filiform, longer than, as long as, or shorter than combined lengths of head and pronotum. Frons, in profile, oblique, straight or weakly convex; frontal ridge sulcate along whole length with distinct carinulae extending to clypeus; facial carinae distinct. Eyes large, ellipsoid. Pronotum subcylindrical, usually with slightly flattened dorsum, median carina very weak, lateral carinae absent, dorsum crossed by three fine sulci; metazona shorter than prozona, with rounded or widely obtuse-angular posterior margin; prosternal process conical with rounded or subacute apex, often slightly bent backwards and sometimes with weakly flattened posterior surface; mesosternal interspace much narrower than long. Tegmina fully developed or shortened but mostly (not in one species) touching in the mid dorsal line; anterior margin, in the female, densely, weakly or not at all spined; hind wing usually with dense hairs on dorsal surface of basal parts of anal veins. Hind femur slender, upper 'knee' lobes rounded, lower 'knee' lobes extended into acute spine-like projections; hind tibia expanded in apical two-thirds with upper outer margins acute, external apical spine present; first segment of tarsus dorso-ventrally compressed. Abdomen with distal segments having dense clusters of hairs ventrally.

Male supra-anal plate rounded triangular, with rounded or angular apex, or weakly trilobate with apical part extended posteriorly; cercus conical or compresssed with rounded, acute, truncate or bifurcate apex; subgenital plate short, conical, with obtuse or weakly truncate apex; epiphallus usually with narrow divided bridge, ancorae usually absent but present in some species, with two pairs of lophi, an outer hook-like pair and an inner, short, tooth-like pair; cingulum with horse-shoe-shaped apodemal structure and a large posterior process which extends backwards over cingular valves; on each side of this process is a fleshy 'lateral lobe', cingular valves fused dorso-medially to form a plate which covers apical penis valves dorso-laterally. This plate often has a postero-apical emargination which may be deep or shallow; endophallus with narrow but complete flexure between basal and apical valves of penis, latter long or short, slender or fleshy.



FIGS 1–11. *Oxya hyla hyla* Serville, male terminalia and genitalia. 1, cercus, lateral view, of specimen from Brazzaville; 2, same, from Madagascar; 3, same, from S. Africa; 4, supra-anal plate, dorsal view; 5, epiphallus, with oval sclerites; 6, phallic complex, entire, lateral view; 7, same, lateral view, epiphallus and ectophallic membrane removed; 8, same, dorsal view; 9, endophallus, lateral view; 10, same, dorsal view; 11, same, ventral view.

Female subgenital plate on visible hind margin often with apical and/or subapical teeth or tubercles, ventral surface often with longitudinal ridges and/or furrow; ovipositor valves long and slender, with spined or toothed external edges; spermatheca with long sinuous preapical and short sac-like apical diverticulum.

Colouration within the genus is fairly uniform and there are two basic colour forms: Green form – Dorsum of head, pronotum and folded tegmina from hind margin to medial vein green-yellow; behind the eyes, the upper half of the lateral plate of the pronotum and the tegmina from the costal margin to the medial vein brown; lower part of head, lateral plate of pronotum and pleurae, green-yellow. Brown form – as green form but dorsum of head, pronotum and folded tegmina, brown.

An intermediate form exists which is similar to the brown form but there are lateral longitudinal yellow stripes running from between the eyes along the lateral margins of the dorsum of the pronotum to the posterior margin of the metazona.

The hind femora are usually green-yellow and the hind tibia are dirty greenish blue or ochraceous.

As the genus is here considered to be an unnatural grouping of species and is retained as a taxonomic unit in its present state for purely practical purposes, it is difficult to discuss its phylogenetic position. However using the morphology of the phallic complex as a basis, the genus may be related along various lines to the rest of the subfamily. *O. hyla* Serville is close to the purely African genus *Zulua; O. japonica* (Thunberg) is similar to the genus *Bumacris* which is known only from the Solomon Is.; *O. paravicina* Willemse relates to *Caryanda* in the Oriental region and the African genera *Dibastica* and *Austeniella; O. diminuta* Walker seems to be close to *Racilia, Tauchira* and possibly *Fer;* and *O. fuscovittata* (Marschall) relates to the Ceylonese genera *Cervina* and *Ochlandriphaga.*

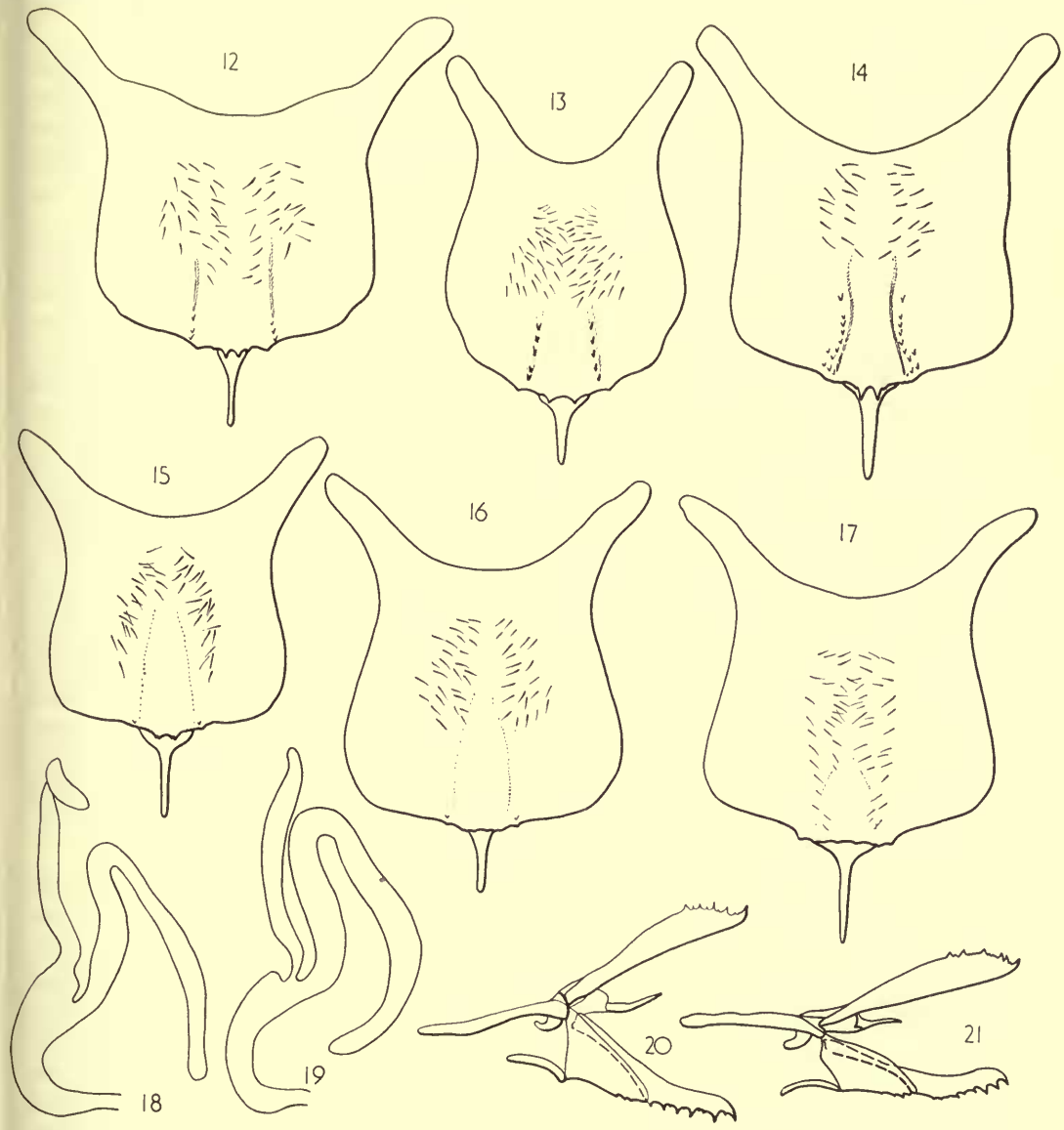
The following characters, both positive and negative, will serve to identify *Oxya* in its present context: external apical spine of the hind tibia present; hind tibia expanded with acute dorso-lateral margins; dorsum of pronotum smooth or finely rugulose, with fine transverse sulci; fastigium or vertex without median longitudinal carinula; prosternal process conical; tegmina fully developed or shortened but never reduced to lobiform condition and without parallel transverse veinlets.

Specific characters and groupings

Willemse (1925), in his revision of the genus and, later (1955), in his work on the Indo-Malayan species, placed great diagnostic emphasis on the number, size and placing of the teeth (or spines) on the visible ventral margin of the female subgenital plate, and the presence or absence and placing of the lateral posterior projections on the hind margins of the female abdominal tergites. No attempt was made in either work to provide identification keys for male specimens.

It has been found that the projections on the female abdominal tergites are without value in identification as they vary tremendously, being present or absent within a species and even varying in size and placing on either side of the abdomen of a single specimen.

The female subgenital plate can be used in diagnosis if its overall structure is considered. The spines on the visible posterior margin are subject to wear during



FIGS 12–21. *Oxya hyla* subspp. female terminalia. *O. h. hyla* Serville, subgenital plate, ventral view of specimens from: 12, Ghana; 13, S. India; 14, Madagascar; 18, spermatheca; 21, ovipositor, lateral view; *O. h. intricata* (Stål), subgenital plate, ventral view of specimens from: 15, Burma; 16, China, 17, Moluccas; 19, spermatheca; 20, ovipositor, lateral view.

the life span of an adult female, due to oviposition but the absence or presence or indicated presence and placing of these spines is of diagnostic use when coupled with the presence or absence of a concavity and/or accompanying lateral longitudinal ridges on the ventral surface of the plate (Text-figs 25, 26).

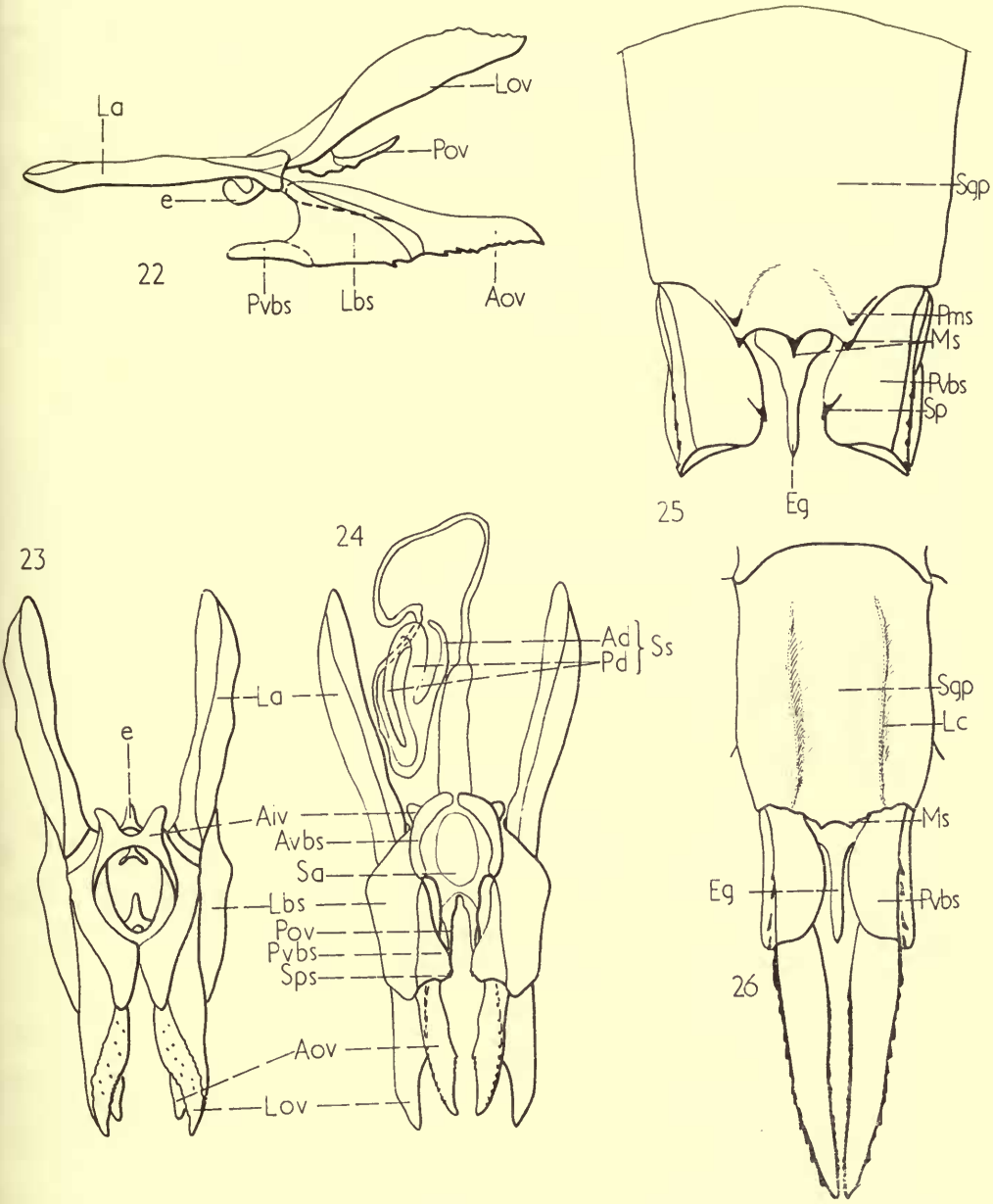
There are two basic types of ovipositor valve in the genus; those with longer, hook-like marginal spines (Text-fig. 20), and those with short, tooth-like marginal spines (Text-fig. 22). The posterior ventral basivalvular sclerite of the ovipositor may be one of three types; the inner ventral margin may have one or two large, tooth-like spines (Text-fig. 25), or a row of small spinelets (Text-fig. 24), or may be completely unarmed (Text-fig. 26).

Mishchenko (*in* Bei-Bienko and Mishchenko, 1951) introduced some characters of the male supra-anal plate and cercus in his key to the species of *Oxya* but placed great emphasis on differences which are here considered to be individual variations. Such general characters of the supra-anal plate as the presence or absence of basi-lateral folds (Text-figs 124, 191), the presence or absence of subapico-lateral tubercles (Text-figs 4, 62, 74) and the general shape or the plate are useful. The cercus seems to vary quite considerably within a given species and in one instance (Text-figs 117–121) is known to vary from acutely pointed to truncate apically. Again however, if considered in general terms, i.e., clearly bifid apically (Text-fig. 216) against truncate or subacute apically (Text-figs 1–3); laterally flattened (Text-fig. 61) against conical, then some diagnostic value is obtained.

The male phallic complex (simplified in Text-figs 5–11) seems to provide the most stable and specifically diagnostic features in the genus. The most readily available characters being in the epiphallus, e.g., its general shape (Text-figs 5, 218, 248), the presence or absence of ancorae (Text-figs 5, 260), and the shape and number of lophi (Text-figs 206, 248). Further characters are found in the ecto-phallus, e.g., the shape of the posterior process of the cingulum (Text-figs 76, 86, 97), and the shape and position of the lateral fleshy lobes on this projection (Text-figs 142, 153); and the form of the valvular plate of the cingulum (Text-figs 10, 64). In the endophallus the form of the apical penis valves is often useful.

Because of its heterogeneous content not a great deal should be said at this stage on the specific groupings within the genus. However, on the basis of the present study, the following general observations can be made. Using the morphology of the phallic complex and particularly the epiphallus as a guide, *O. bidentata* Willemse, *O. sinobidentata* sp. n. and *O. javana* Willemse form a distinct group, all having a plate-like epiphallus with ancorae and a broad bridge. Similarly *O. paravicina* Willemse and *O. diminuta* (Walker) may be grouped together, as in these two species the epiphallus has ancorae but a narrow bridge and the hind margin of the tenth abdominal tergite bears a pair of short median projections. This leaves a more homogeneous assemblage of species with simple epiphalli without ancorae and their groupings are less well defined.

O. hyla Serville with its tuberculate male supra-anal plate, boot-like outer lophi of the epiphallus, densely spined leading edge of the female tegmen and long spined ovipositor valves, seems quite distinct but has links through *O. fuscovittata* (Mar-



FIGS 22–26. *Oxya* spp. female terminalia. *O. fuscovittata* (Marschall), 22, ovipositor, lateral view; 23, same, dorsal view; 24, same, ventral view; *O. bolaangensis* sp. n. 25, subgenital plate and posterior ventral basivalvular sclerite, ventral view (from dry specimen); *O. grandis* Willemse, 26, subgenital plate and ovipositor, ventral view (from dry specimen). Ad – apical diverticulum of spermatheca; Aiv – anterior intervalvula; Aov – anterior (ventral) ovipositor valve; e – apodeme bearing sclerite; Eg – egg guide; La – lateral apodeme; Lbs – lateral basivalvular sclerite; Lc – lateral longitudinal ridge; Lov – lateral (dorsal) ovipositor valve; Ms – marginal spine; Pd – preapical diverticulum of spermatheca; Pms – premarginal spine; Pov – posterior (inner) ovipositor valve; Pvbs – posterior ventral basivalvular sclerite; Sa – spermathecal aperture; Sgp – subgenital plate; Sp – spine; Sps – spinelet; Ss – spermathecal sac.

schall), its closest relative, *O. minuta* Carl and *O. grandis* Willemse to *O. velox* (Fabricius) and *O. ningpoensis* Chang; the latter two species having an extraordinary development of aedeagal tip. In all these species the posterior ventral basivalvular sclerite of the female ovipositor is not at all or only very weakly spined.

The remaining species, *O. japonica* (Thunberg), *O. nitidula* (Walker), *O. bolaangensis* sp. n., *O. stresemanni* Ramme, *O. agavisa* Tsai, *O. chinensis* (Thunberg) and *O. yezoensis* Shiraki, are grouped together simply as no clearer groupings emerge at present. *O. chinensis* and *O. yezoensis* have similar forms of phallic complex, male supra-anal plate and female subgenital plate; and for similar reasons *O. japonica*, *O. nitidula*, *O. stresemanni* and *O. bolaangensis* could be grouped together; *O. agavisa* appears intermediate between *O. chinensis* and *O. japonica*.

Keys to the Species and Subspecies

Great care should be taken when using the specific identification keys. It was found more practical to key the sexes separately as the females had more obvious external characters. With many species the only reliable diagnostic characters in the male are in the phallic complex but these characters can usually be seen in fresh specimens by pushing down the subgenital plate and examining the exposed phallic complex with a hand lens. Dried specimens have to be relaxed or dissected before these characters can be studied.

At any point in the keys where a species could possibly give difficulty it is keyed out twice, e.g. *O. fuscovittata* and *O. yezoensis*.

Wherever possible figures are referred to with the key characters. These figures were usually drawn after dissection of the relevant part, slight maceration in 10% KOH solution and soaking in distilled water. When this was not possible and the figure was drawn from a dry specimen, this is stated in the figure-legend.

Males

1 Supra-anal plate with a tubercle on each side of a median apical process, making the plate appear weakly trilobate (Text-figs 4, 62) 2

– Supra-anal plate without lateral tubercles (Text-figs 74, 84) 4

2 Cercus laterally compressed, hardly narrowing towards apex, which is weakly bifurcate (Text-fig. 61) . . . . . ***fuscovittata*** (Marschall) (p. 289)

– Cercus conical or if compressed then narrowing towards apex, which is obtuse or truncate (Text-figs 1–3) 3

3 Inner tooth-like pair of lophi of epiphallus usually well developed (Text-figs 27–32). Africa, Madagascar, Oriental region west of Indo-Burmese border ***hyla hyla*** Serville (p. 282)

– Inner tooth-like pair of lophi of epiphallus usually poorly developed (Text-figs 33, 36–40). Oriental region east of Indo-Burmese border ***hyla intricata*** (Stål) (p. 287)

4 Lower inner area of hind femur and the hind tibia bright red; integument more rugulose, giving matt appearance . . . . . ***diminuta*** Walker (p. 336)

– Lower inner area of hind femur ochraceous green; hind tibia bluish green or ochraceous (some populations from Australasian region may be pale orange); integument less rugulose, giving shiny appearance 5

5 Strongly brachypterous species (almost to micropterous condition), tegmina barely touching along mid dorsal line; 10th abdominal tergite with a pair of small rounded projections on the posterior margin on either side of the mid line (Text-fig. 247) ***paravicina*** Willemse (p. 333)

– Macropterous species, but if brachypterous, then tegmina touching one another for some distance along the mid dorsal line; 10th abdominal tergite without small rounded projections on the posterior margin 6

6 Epiphallus with broad plate-like bridge, ancorae present, lophi lobiform and situated almost at division of bridge (Text-fig. 218); cerci bifurcate with both upper and lower branches conical with subacute apices (Text-fig. 216) 7

– Epiphallus with narrow bridge, without ancorae and with outer pair of hook-like lophi and an inner pair of tooth-like lophi (Text-fig. 206); cercus with subacute (Text-fig. 94), truncate (Text-fig. 121), or weakly bifurcate apex (Text-fig. 106) and if latter then upper branch with rounded apex 9

7 Chinese populations; hind femur orange-brown in apical quarter
sinobidentata sp. n. (p. 330)

– Javan or W. Pakistani populations; hind femur unicolourously green or ochraceous 8

8 Tegmina long, extending well beyond apices of hind femora. W. Pakistan and surrounding area . . . . . ***bidentata*** Willemse (p. 328)

– Tegmina shorter, not at all or hardly surpassing apices of hind femora. Java
javana Willemse (p. 333)

9 Valvular plate of cingulum very long, upcurved, rolled almost into a cylinder, with an expanded apex (Text-fig. 99) . . . . . ***velox*** (Fabricius) (p. 297)

– Valvular plate of cingulum either in the form of a curved plate (Text-figs 88, 89) or short and fleshy (Text-fig. 111) 10

10 Valvular plate of cingulum short and fleshy, with complicated folds (Text-figs 109–112) . . . . . ***ningpoensis*** Chang (p. 300)

– Valvular plate of cingulum simple, curved, plate-like (Text-fig. 88) 11

11 Supra-anal plate, when flat, with the apical part lobe-like and extended posteriorly (Text-figs 74, 84), never with basal folds 12

– Supra-anal plate, when flat, triangular or rounded triangular (Text-figs 140, 151), apical part not extended posteriorly, but if so then basal folds clearly present (Text-fig. 124) 13

12 Small species (15·6–19·2 mm); tegmina shortened, not extending beyond 4th abdominal tergite; cercus simple, conical with subacute apex . ***minuta*** Carl (p. 293)

– Large species (over 30 mm); tegmina fully developed and extending beyond apices of hind femora; cercus with bifid apex, upper lobe rounded (Text-fig. 83)
grandis Willemse (p. 294)

13 Cercus with bifid apex (Text-fig. 122). Ceram eastwards to New Hebrides
japonica vitticollis (Blanchard) (p. 307)

– Cercus with rounded, truncate or pointed apex (Text-figs 117–121). West of Ceram except Hawaii 14

14 Supra-anal plate relatively flat, without basilateral folds (Text-fig. 140) . . 15

– Supra-anal plate with well developed basilateral folds (Text-fig. 151) . . . 17

15 Apical valves of penis very sinuous (Text-fig. 145). Celebes only
stresemanni Ramme (p. 310)

– Apical valves of penis simply curved, not at all sinuous. China, S. E. Russia, Japan 16

16 Apical valves of penis slender; valvular plate of cingulum slender (Text-fig. 177)
chinensis (Thunberg) (p. 322)

– Apical valves of penis stout; valvular plate of cingulum broad (Text-figs 208, 209)
yezoensis Shiraki (p. 326)

17 Posterior process of cingulum (excluding lateral lobes), when viewed from above trapezoid (Text-figs 176, 207) 18

– Posterior process of cingulum (excluding lateral lobes), when viewed from above, rounded triangular (Text-figs 125, 163) 20

18 Apical penis valves relatively large and fleshy (Text-fig. 209); inner pair of lophi or epiphallus relatively large (Text-fig. 206) . . . . ***yezoensis*** Shiraki (p. 326)

– Apical penis valves slender (Text-fig. 186); inner pair of lophi of epiphallus relatively small (Text-fig. 184) 19

19 Brachypterous populations . . . . . ***agavisa tinkhami*** Uvarov (p. 319)
– Macropterous populations . . . . . ***agavisa agavisa*** Tsai (p. 317)
20 Posterior process of cingulum divided dorsally in posterior half (Text-fig. 163); inner lophi of epiphallus relatively long and slender (Text-fig. 162) 21
– Posterior process of cingulum not divided dorsally in posterior half (Text-fig. 153); inner lophi of epiphallus relatively short and stubby (Text-fig. 152) ***bolaangensis*** sp. n. (p. 312)
21 Posterior process of cingulum, when viewed from above broadly triangular (Text-fig. 125) 22
– Posterior process of cingulum, when viewed from above, narrowly triangular (Text-fig. 163) . . . . . ***nitidula*** (Walker) (p. 315)
22 Cercus with truncate or subacute apex (Text-figs 117–121). Populations from Halmahera westwards to Ceylon, Hawaii ***japonica japonica*** (Thunberg) (p. 302)
– Cercus with bifid or strongly truncate apex (Text-fig. 122). Populations from Ceram eastwards to New Hebrides . ***japonica vitticollis*** (Blanchard) (p. 307)

Females

1 Anterior margin of tegmen (leading edge) with a dense row of short bristles extending from costal bulge almost to apex of tegmen; ovipositor valves with long teeth, the apical ones curved (Text-fig. 20) 2
– Anterior margin of tegmen only weakly or not at all spined or bristled; valves of ovipositor with short teeth (Text-fig. 22) 4
2 Visible ventral surface of subgenital plate almost completely flat or weakly concave, appearing to widen posteriorly (Text-fig. 70) . ***fuscovittata*** (Marschall) (p. 289)
– Visible ventral surface of subgenital plate flat or concave only in median posterior half, not widening posteriorly (Text-figs 12–17) 3
3 Ventral surface of subgenital plate with two longitudinal ridges extending forwards from posterior margin, these ridges often toothed (Text-figs 12–14). Africa, Madagascar, Oriental region west of Indo-Burmese border ***hyla hyla*** Serville (p. 282)
– Ventral surface of subgenital plate without longitudinal ridges or with only slight traces of them apically and they are not at all spined (Text-figs 15–17). Oriental region east of Indo-Burmese border . . . ***hyla intricata*** (Stål) (p. 287)
4 Lower inner area of hind femur and the hind tibia bright red; integument with more rugulose and matt surface; (never from Australasian region) ***diminuta*** Walker (p. 336)
– Lower inner area of hind femur and hind tibia bluish green or ochraceous (in some Australasian populations these areas are orange); integument smooth, shiny . 5
5 Posterior ventral basivalvular sclerite of ovipositor without any well defined spines on its lower inner margin (Text-fig. 26) 6
– Posterior ventral basivalvular sclerite of ovipositor with one or two tooth-like spines on its inner ventral margin (Text-fig. 25) 14
6 Brachypterous species 7
– Macropterous species 8
7 Larger species, over 30 mm; ventral surface of subgenital plate without lateral longitudinal carinulae (Text-fig. 256) . . . . . ***paravicina*** Willemse (p. 333)
– Smaller species, under 26 mm; ventral surface of subgenital plate with lateral longitudinal ridges in posterior half (Text-fig. 80) . . . ***minuta*** Carl (p. 293)

8 Posterior margin of subgenital plate, excluding spines, with triangular ventral profile (Text-fig. 227) 9
– Posterior margin of subgenital plate, excluding spines, transverse (Text-figs 70, 113) 11
9 Tegmen short, not or hardly surpassing apex of hind femur. Java
javana Willemse (p. 333)
– Tegmen longer, clearly surpassing apex of hind femur. China and West Pakistan . 10
10 Hind femur reddish brown subapically. E. China . ***sinobidentata*** sp. n. (p. 330)
– Hind femur unicolourously ochraceous green; West Pakistan and surrounding area
bidentata Willemse (p. 328)
11 Subgenital plate with ventral surface very flat and without lateral longitudinal ridges (Text-fig. 70); anterior margin of tegmen with a few small bristles
fuscovittata (Marschall) (p. 289)
– Ventral surface of subgenital plate with lateral longitudinal ridges bordering a median concavity at least in posterior half (Text-fig. 90); anterior margin of tegmen without trace of bristles 12
12 Tegmen not reaching apex of hind femur; pronotum cylindrical. E. China
ningpoensis Chang (p. 300)
– Tegmen always extending beyond apex of hind femur; pronotum relatively flat. N. India, Upper Burma, W. China 13
13 Median pair of spines on posterior margin of subgenital plate set close together (Text-fig. 90); costal bulge of tegmen well developed . ***grandis*** Willemse (p. 294)
– Median pair of spines on posterior margin of subgenital plate set wider apart (Text-fig. 101); costal bulge of tegmen poorly developed . . ***velox*** (Fabricius) (p. 297)
14 Ventral surface of subgenital plate with a broad median longitudinal groove running from posterior margin at least to visible middle of plate, with a lateral longitudinal ridge on each side (Text-figs 130, 134) 15
– Ventral surface of subgenital plate convex, flat or, at most, with a weak apical concavity (Text-figs 158, 170) 18
15 Subgenital plate with a sharply triangularly profiled posterior margin (Text-fig. 180); interocular distance wider than greatest width of frontal ridge . . . 16
– Posterior margin of subgenital plate (excluding spines) almost transverse (Text-fig. 130); interocular distance not wider than greatest width of frontal ridge . . 17
16 Brachypterous populations . . . . ***agavisa tinkhami*** Uvarov (p. 319)
– Macropterous populations . . . . . ***agavisa agavisa*** Tsai (p. 317)
17 Lateral longitudinal ridges on ventral surface of subgenital plate with spines (Text-fig. 134) . . . . . ***japonica vitticollis*** (Blanchard) (p. 307)
– Lateral longitudinal ridges on ventral surface of subgenital plate without spines except at apices (Text-fig. 130) . . ***japonica japonica*** (Thunberg) (p. 302)
18 Ventral surface of subgenital plate with a subapical tooth on each side of a median apical spine (Text-fig. 170) . . . . . ***nitidula*** (Walker) (p. 315)
– Ventral surface of subgenital plate without subapical teeth (Text-fig. 149) . . . 19
19 Posterior margin of subgenital plate with a single spine medially (Text-fig. 158) .
bolaangensis sp. n. (p. 312)
– Posterior margin of subgenital plate with a pair of spines medially or no spines at all (Text-figs 149, 198) 20
20 Ventral surface of subgenital plate concave in apical third medially (Text-fig. 149)
stresemanni Ramme (p. 310)
– Ventral surface of subgenital plate completely convex. 21
21 Tegmen not extending beyond apex of hind femur. Japan and Taiwan only
yezoensis Shiraki (p. 326)
– Tegmen extending beyond apex of hind femur but if shorter then not Japanese populations. S. E. Russia, Korea, China and Ryukyu Is.
chinensis (Thunberg) (p. 322)

DESCRIPTIONS OF THE SPECIES AND SUBSPECIES

Oxya hyla Serville, 1831

This species is divided into two subspecies.

Oxya hyla hyla Serville, 1831

(Text-figs 1–11, 12–14, 18, 21, 27–32, 41–46, 54)

Oxya hyla Audinet-Serville, 1831: 287. Syntypes, Senegal and Java (lost). NEOTYPE ♂, SENEGAL, 'Senegal, Richard-Toll, xi-1967. Museum Paris. Mission IFAN Museum. A. Descarpentries, T. Leye et A. Villiers' (MNHN, Paris), here designated [examined].
Acridium (*Oxya*) *hyla* (Audinet-Serville) Audinet-Serville, 1839: 678, pl. 12, fig. 4.
Heteracris viridivitta Walker, 1870: 662. Holotype ♂, SOUTH AFRICA, 'Dr Smith, S. Afr.' (BMNH) [examined]. [Synonymized by Kirby, 1910: 393.]
Heteracris humeralis Walker, 1870: 662. Holotype ♀, 'MADAGASCAR' (BMNH) [examined]. [Synonymised by Kirby, 1910: 393.]
Oxya serrulata Krauss, 1891: 662, pl. 45, figs 8, A, B. Syntypic series, SÃO TOMÉ, 'São Thomé, Rolas'. [Synonymized by Kirby, 1910: 393.]
Oxya serrulata Krauss; Brunner von Wattenwyl, 1893: 152.
Oxya serrulata minor Sjöstedt, 1909: 196. LECTOTYPE ♂, KENYA: Kilimanjaro (NR, Stockholm), here designated [examined]. [Synonymised by I. Bolívar, 1918: 15.]
Oxya hyla Audinet-Serville; I. Bolívar, 1918: 15.
Oxya viridivitta (Walker) Willemse, 1925: 38, figs 39–41.
Oxya acuminata Willemse, 1925: 42, figs 42–44. Holotype ♀, INDIA, 'Coll. Br. v. W. Mahé, (Malabar), Emile Deschamps', (NM, Vienna) [examined]. **Syn. n.**
Oxya multidentata Willemse, 1925: 44, figs 45–48. Holotype ♀, 'H. M. Lefroy' [probably INDIA] (BMNH) [examined]. **Syn. n.**
Oxya ebneri Willemse, 1925: 46, figs 49–51. Holotype ♀, INDIA, 'Calcutta, Dr Steiner' (NM Vienna) [examined]. **Syn. n.**
Oxya hyla Audinet-Serville; Johnston, 1956: 252.
Oxya hyla minor Sjöstedt; Johnston, 1956: 252.
Oxya viridivitta (Walker); Chopard, 1958: 128.
Oxya humeralis (Walker) Dirsh, 1962: 309, fig. 19.
Oxya hyla Audinet-Serville; Dirsh, 1963: 211.

This taxon was described originally from an unknown number of specimens from Senegal and Java and it is now known that the syntypic series is lost. In the past (see Synonymy below) there has been some confusion over the application of the name *O. hyla* Audinet-Serville, 1831 and in order to stabilise nomenclature a neotype is erected bearing the data given above.

DIAGNOSIS. ♂. Integument finely pitted, shiny. Antenna slightly longer than head and pronotum together, with about 25 segments. Interocular distance slightly narrower than frontal ridge at median ocellus. Pronotum slightly flattened, hardly narrowing forwards, posterior margin of metazona rounded. Tegmen fully developed. Supra-anal plate (Text-fig. 4) trapezoid with triangular apical projection, at base of this projection, on dorsal surface, on either side there is a small tubercle; cercus conical or compressed laterally (Text-figs 1–3), with subacute or truncate apex. Epiphallus (Text-figs 11, 27–32) with narrow bridge, without ancorae, with curved hook-like outer lophi and usually well developed tooth-like inner lophi; rest of phallic complex as in Text-figs 6–11; apical valves of penis short and stubby, valvular plate of cingulum with a small emargination at apex (Text-figs 41–46).

♀. Larger and more robust than male. Antenna slightly shorter than combined lengths of head and pronotum. Interocular distance as wide as or slightly wider than frontal ridge at median ocellus. Anterior margin of tegmen with a dense row of short bristles. Spermatheca as in Text-fig. 18; valves of ovipositor with hook-like marginal spines (Text-fig. 21); inner ventral margin of posterior ventral basivalvular sclerite with very small spinelets; subgenital plate (Text-figs 12–14) with a pair of median spines on posterior margin, ventral surface with a median longitudinal concavity, which is bordered on each side by a longitudinal ridge bearing short spines.

MEASUREMENTS (mm) – Length of body, ♂ 17·5–27·0, ♀ 22·0–35·7; pronotum, ♂ 3·3–5·7; ♀ 4·3–7·5; tegmen, ♂ 12·5–25·8, ♀ 17·5–31·4; hind femur, ♂ 9·6–15·5, ♀ 11·9–20·6; maximum width of hind femur, ♂ 2·0–3·2, ♀ 2·4–4·3; mean ratio of length of tegmen to pronotum (E/P), ♂ 4·26, ♀ 4·09; mean ratio of length of tegmen to length of hind femur (E/F), ♂ 1·52, ♀ 1·49; mean ratio of hind femoral length to its maximum width (FL/FW), ♂ 4·90, ♀ 4·98.

DISCUSSION. This subspecies has a relatively large geographical range and, coupled with this feature, is tremendously variable in its general size and appearance. The length of the tegmen relative to the pronotum (E/P) is very variable for a fully winged taxon within this genus, the range in a measured random sample of 28 males being 3·56 to 4·82, and in a similar sample of 32 females being 3·40 to 4·84. There is a general tendency for the E/P value to be lower in African populations, with that of the Madagascan populations rather intermediate. The male cercus varies from conical with a subacute to weakly compressed with a truncate apex (Text-figs 1–3), and the posterior margin of the valvular plate of the cingulum varies in its degree of emargination (Text-figs 41–46). In the female subgenital plate the density of spines along the lateral longitudinal ridges is also variable (Text-figs 12–14), with the Madagascan specimens generally being most dense and African specimens least dense.

References to biological and economic literature on this subspecies may be found in Uvarov (1928), Johnston (1956 and 1968), Butani (1961), Descamps and Wintrebert (1966) and Bullen and MacCuaig (1969).

SYNONYMY. Walker's types of *H. viridivitta* and *H. humeralis* both fall well within the range of variation of *O. hyla hyla* as it is understood here and Kirby's synonymy is accepted.

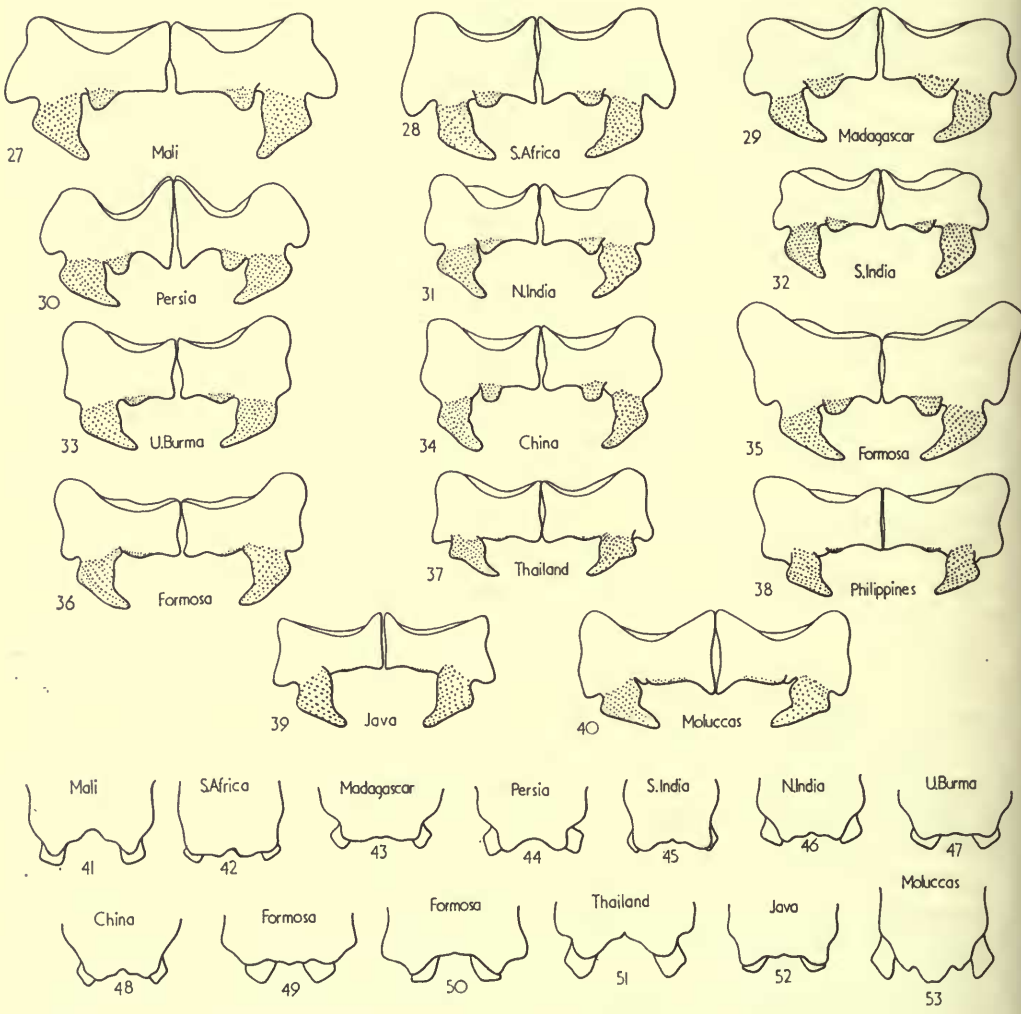
O. serrulata Krauss was described from several specimens of both sexes from 'São Thomé, Rolas'. I have not seen this series but from the original description and drawings and other material from São Tomé it is clear that Kirby's synonymy should be accepted.

The type-series of *O. serrulata minor* Sjöstedt consists of 3 ♂ and 1 ♀ from Kilimanjaro. Sjöstedt did not designate a type from this series but I have examined 1 ♂ and 1 ♀ bearing the data 'Kilimandjaro, Sjöstedt. 1905–6. Kibonoto, 1,000–1,200 m. 1. nov.' The male bears a NR, Stockholm type-label and this specimen is selected as LECTOTYPE. The series is typical of upland populations of *O. hyla hyla* and does not warrant subspecific status.

Willemse (1925) used the Walkerian name *viridivitta* for this species as he was uncertain of the identity of *O. hyla* Serville. However, as Uvarov (1926) pointed out, although Serville obviously included more than one taxon under the name

hyla this 'did not invalidate the name', and as Willemse included *hyla* in his synonymy of *O. viridivitta* it must become the senior synonym.

Willemse (1925) described *O. acuminata*, *O. multidentata* and *O. ebneri* from various localities, mostly in India, differentiating them from *hyla* and one another on such characters as the width of the hind femur, eye size, and the degree of reclin-



FIGS 27–53. Epiphalli and penis apices of *Oxya hyla* subspp. *O. h. hyla* Serville, epiphalli from various localities, figs 27–32; dorsal view of posterior apex of valvular plate of cingulum of specimens from various localities, figs 41–46; *O. h. intricata* (Stål), epiphalli of specimens from various localities, figs 33–40; dorsal view of posterior apex of valvular plate of cingulum of specimens from various localities, figs 47–53.

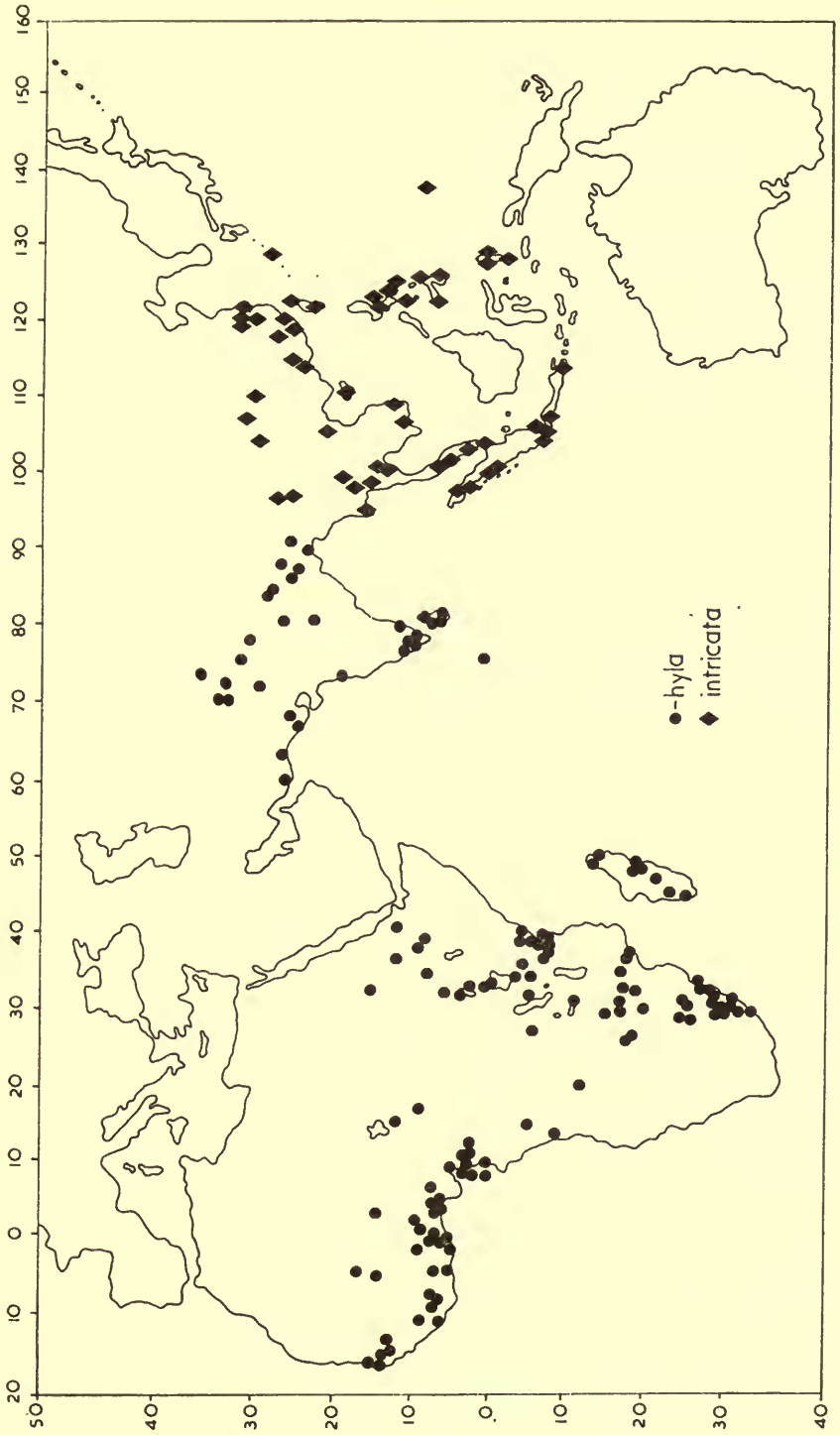


FIG. 54. *Oxya hyla* subspp., distribution map.

ation of the frons. After examination of long series from various localities in Africa, Madagascar, Iran and the Indo-Pakistan region, it seems that these differences merely represent individual morphological variations and the above synonymy is made. Uvarov (1925) has already hinted at the synonymy of *multidentata* with *hyla*. The ♀ paratype of *multidentata* from Stapak, Kuala Lumpur and the two ♀ paratypes of *ebneri* from Singapore are referrable to *O. hyla intricata* (Stål).

Dirsh (1962) used the name *humeralis* for Madagascan populations of this subspecies as he considered that *hyla* was not sufficiently defined and the African populations might represent more than one species. For reasons stated above, the variations found in African populations of *hyla* are not considered to be of morphologically subspecific importance and the Madagascan populations merge very well with the general variation plan of the subspecies.

Chopard (1958) erroneously regarded a specimen from Malabar, mentioned by Serville (1838) and bearing his handwritten label, as the type of *O. hyla* Serville, 1831. He considered this specimen to be a distinct species from African *hyla* (auctt.) and used *viridivitta* for the latter. Dirsh (1963) first pointed out this error of type-designation of *O. hyla*. Serville's specimen (a female), deposited in MNHN, Paris, has been examined and is regarded as conspecific with *O. hyla* Serville in the present context.

Willemse (1925: 41) regarded *Cantantops cyanipes* Karny, 1907 as a junior synonym of *O. viridivitta*, and Dirsh (1956: 107) regarded it as a synonym of *O. hyla*. The male holotype of *Catantops cyanipes* Karny is from 'Uganda, Gondokoro, Marz 1908' and is deposited in NM, Vienna. It is clearly not conspecific with *O. hyla* and is here transferred to the genus *Zulua* as *Zulua cyanipes* (Karny, 1907) **comb. n.**

Distribution (Text-fig. 54). Countries and months of capture, from 807 specimens examined.

Mali: February, April, May, July, August, October, November; Senegal: January, June, August to November; Gambia: no dates; Guinea: no dates; Sierra Leone: June; Liberia: March, April, July, September; Ivory Coast: January, March, April, July, October, December; Ghana: July through to May; Dahomey: June; Niger: March, December; Nigeria: October through to January, March, April, June; Chad: October; Cameroun: January to August, November; Fernando Po: no dates; Principé: September, December; São Thomé: June September; Central African Republic: January, June; Gabon: August; Congo (Brazzaville): January, February, November; Congo (Kinshasa): August to October; Sudan: October, December; Ethiopia: December through to February, May, September; Kenya: March, August; Uganda: July, September, October, December; Tanzania: November through to September; Malawi: April, December; Zambia: March, April, June; Angola: May, June, August; Mozambique: July, October; Rhodesia: March to May; South Africa: August through to June; Madagsacar: January, February, April, May, July; Persia: June; Afghanistan: July to September, November; W. Pakistan: July, September to November; Nepal: January, May, October, December; India: all year round; Ceylon: January to April, July, August, October; Maldive Is: May; E. Pakistan: October.

Oxya hyla intricata (Stål, 1861) stat. n.

(Text-figs 15–17, 19, 20, 33–40, 47–60)

Acridium (*Oxya*) *intricatum* Stål, 1861: 335. LECTOTYPE ♂, West Malaysia, 'Malacca. Kinb.' (NR, Stockholm), here designated [examined].
Oxya intricata (Stål) Stål, 1873: 82.
Oxya intricata (Stål); Brunner von Wattenwyl, 1893: 153, partim.
Oxya intricata (Stål); I. Bolívar, 1918: 16, partim.
Oxya universalis Willemse, 1925: 21, figs 12, 13. Holotype ♀, Taiwan, 'Takao, Formosa, H. Sauter', (NM, Vienna) [examined]. [Synonymized by Uvarov, 1926: 45.]
Oxya insularis Willemse, 1925: 34, figs 32, 33. Holotype ♀, Taiwan, 'Takao, Formosa, H. Sauter' (NM, Vienna) [examined]. [Synonymized by Uvarov, 1926: 45.]
Oxya siamensis Willemse, 1925: 37, figs 36–38. Holotype ♀, Thailand, 'Pachim District, Siam' (BMNH) [examined]. [Synonymized by Willemse, 1955: 149.]
Oxya intricata (Stål); Willemse, 1925: 57, fig. 64.
Oxya siamensis Willemse; Uvarov, 1926: 46.
Oxya intricata (Stål); Uvarov, 1928: 317, fig. 115, I, A.
Oxya intricata (Stål); Willemse, 1930: 122, figs 60, 61.
Oxya intricata (Stål); Willemse, 1931: 238.
Oxya intricata (Stål); Chang, 1934: 186.
Oxya intricata (Stål); Tinkham, 1940: 294.
Oxya moluccensis Ramme, 1941: 214. Holotype ♀, Maluku, 'Halmaheira, Gamkonora, 4 u. 5. 1931, G. Heinrich' (NMHU, Berlin) [examined]. **Syn. n.**
Oxya intricata (Stål); Mishchenko, 1951: 168, partim, figs 302, 304, 306.
[*Oxya rammei* Tsai; Mishchenko, 1951: 168, partim, figs 305, 308. Misidentification.]
Oxya intricata (Stål): Mishchenko, 1952: 158, partim, figs 226, 237, 239, 241.
[*Oxya rammei* Tsai; Mishchenko, 1952: 160, partim, figs 240, 243. Misidentification.]
Oxya intricata (Stål); Willemse, 1955: 149.
[*Oxya acuminata* Willemse; Willemse, 1955: 151, partim. Misidentification.]
[*Oxya multidentata* Willemse; Willemse, 1955: 152, partim. Misidentification.]
[*Oxya ebneri* Willemse; Willemse, 1955: 152. Misidentification.]
Oxya moluccensis Ramme; Willemse, 1955: 148.
Oxya intricata (Stål); Pemberton, 1963: 679.
Oxya intricata (Stål); Fukuhara, 1966: 202.
Oxya intricata (Stål): Yunus, 1967: 632.
Oxya intricata (Stål); Bullen and MacQuaig, 1969: 398.

This taxon was based on several specimens of both sexes from Java, Malacca, Singapore and Hong Kong. The 'Malacca' specimen bears a label in Stål's handwriting '*intricatum* Stål' and an NR, Stockholm type label, and is selected as the lectotype. Also in NR, Stockholm there is a male specimen labelled 'China. Kinb.' with both wings set and its measurements agree with those given by Stål; and yet another male labelled 'Java. Kinb.'; both these specimens are regarded here as paralectotypes of *Acridium* (*Oxya*) *intricatum* Stål, 1861.

Diagnosis. ♂. Differs from nominate subspecies in that inner lophi of epiphallus are normally poorly developed or almost absent. (Text-figs 33, 36–40).

♀. Differs from nominate subspecies in that ventral surface of subgenital plate is without longitudinal ridges or with only slight traces of them apically, and they are not at all spined except at most posterior apex (Text-figs 15–17).

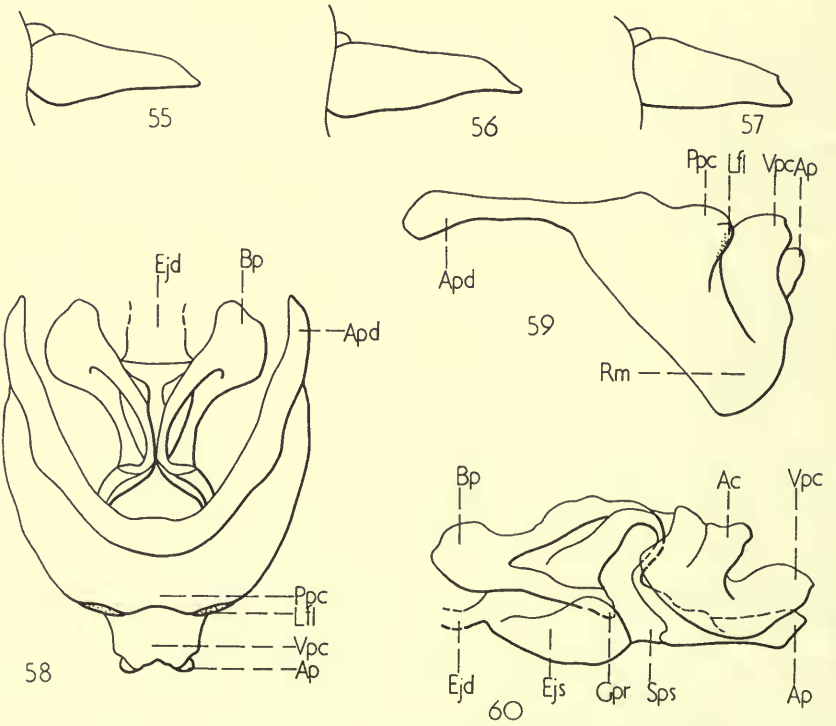
Measurements (mm) – Length of body, ♂ 17·9–24·2, ♀ 24·9–29·9; pronotum, ♂ 3·5–5·1, ♀ 4·9–6·2; tegmen, ♂ 14·0–21·1, ♀ 19·5–25·4; hind femur, ♂ 10·0–13·8, ♀ 13·5–17·1; maximum

width of hind femur, ♂ 2·0–2·7, ♀ 2·6–3·3; mean ratio of length of tegmen to pronotum (E/P), ♂ 4·15, ♀ 4·04; mean ratio of length of tegmen to hind femur (E/F), ♀ 1·46, ♀ 1·44; mean ratio of hind femoral length to maximum width (FL/FW), ♂ 4·91, ♀ 5·05.

Discussion. As with the nominate subspecies, *O. hyla intricata* is very widely distributed and is very variable in size, relative length of tegmen, degree of emargination of the posterior margin of the valvular plate of the cingulum, and the degree of development of the lateral longitudinal ridges on the ventral surface of the subgenital plate.

It must be stressed that the division of *O. hyla* into two subspecies is arbitrary and the geographical line of demarcation, i.e., the Indo-Burmese border, rather more practical than real. As can be seen from Text-figs 27–40, the epiphallic character used to separate the two taxa in the male is not particularly good as the *hyla hyla* type appears in the *hyla intricata* range, but so far the converse has not been observed. The female subgenital plate character is rather more reliable.

It is possible that the *hyla – intricata* complex represents a superspecies or a sibling species-group or reticulum and some statistical work, coupled with obser-



Figs 55–60. *Oxya hyla intricata* (Stål), male terminalia and genitalia; 55, cercus, lateral view, of specimen from Philippines; 56, same, from Moluccas; 57, same, from China; 58, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 59, cingulum, lateral view; 60, endophallus, lateral view.

vations on behaviour, cytological studies and breeding experiments, will have to be carried out before the problem is clarified.

SYNONYMY. Uvarov (1926) synonymized *O. universalis* Willemse and *O. insularis* Willemse with *O. intricata* (Stål). After examining Willemse's and Stål's type-material and a mass of material from S. E. Asia this synonymy is accepted. The female paratype of *insularis* labelled 'Ceylon; Vega exp.' and deposited in NR, Stockholm, is referred to *O. hyla hyla*. Uvarov (1926) also expressed doubts about the validity of *O. siamensis* Willemse and later Willemse (1955) formally synonymized this species with *intricata*.

The female paratype of *O. rammei* Tsai labelled 'China, Canton, Lien-cao, 29. 7·12, Mell S.V.' (MNHU, Berlin) is referred to *O. hyla intricata*. This specimen was badly damaged in postal transit from Berlin.

The type-series of *O. moluccensis* Ramme consists of the male holotype and four male and four female paratypes from Halmahera. (The holotype and one female paratype were also badly damaged in postal transit from Berlin.) After examination of the holotype and a male and two female paratypes, together with material from neighbouring islands it is clear that, morphologically, *moluccensis* represents the extreme south-eastern populations of *hyla intricata* and the above synonymy is made. The complete reduction of the inner lophi of the epiphallus and ventral longitudinal ridges of the female subgenital plate are culminations of observable trends as the subspecies extends eastwards.

DISTRIBUTION (Text-fig. 54). Countries and months of capture from 337 specimens examined.

BURMA: November through to January, May, June; CHINA: March, May to December; TAIWAN: March; RYUKU IS: November; THAILAND: March to August, October, November; VIETNAM: September; WEST MALAYSIA: April through to February; SINGAPORE: May, July, August, October, December; SUMATRA: November through to April, July to September; JAVA: June; KRAKATAU: November; PHILIPPINES all year round; PALAUS IS: March. (Significantly absent from Borneo and Celebes.)

Oxya fuscovittata (Marschall, 1836)

(Text-figs 22–24, 61–72)

Gryllus fuscovittatus Marschall, 1836: 211, pl. 18, fig. 3. Holotype ♀, no data [probably N.W. INDIA] (NM, Vienna) [examined].

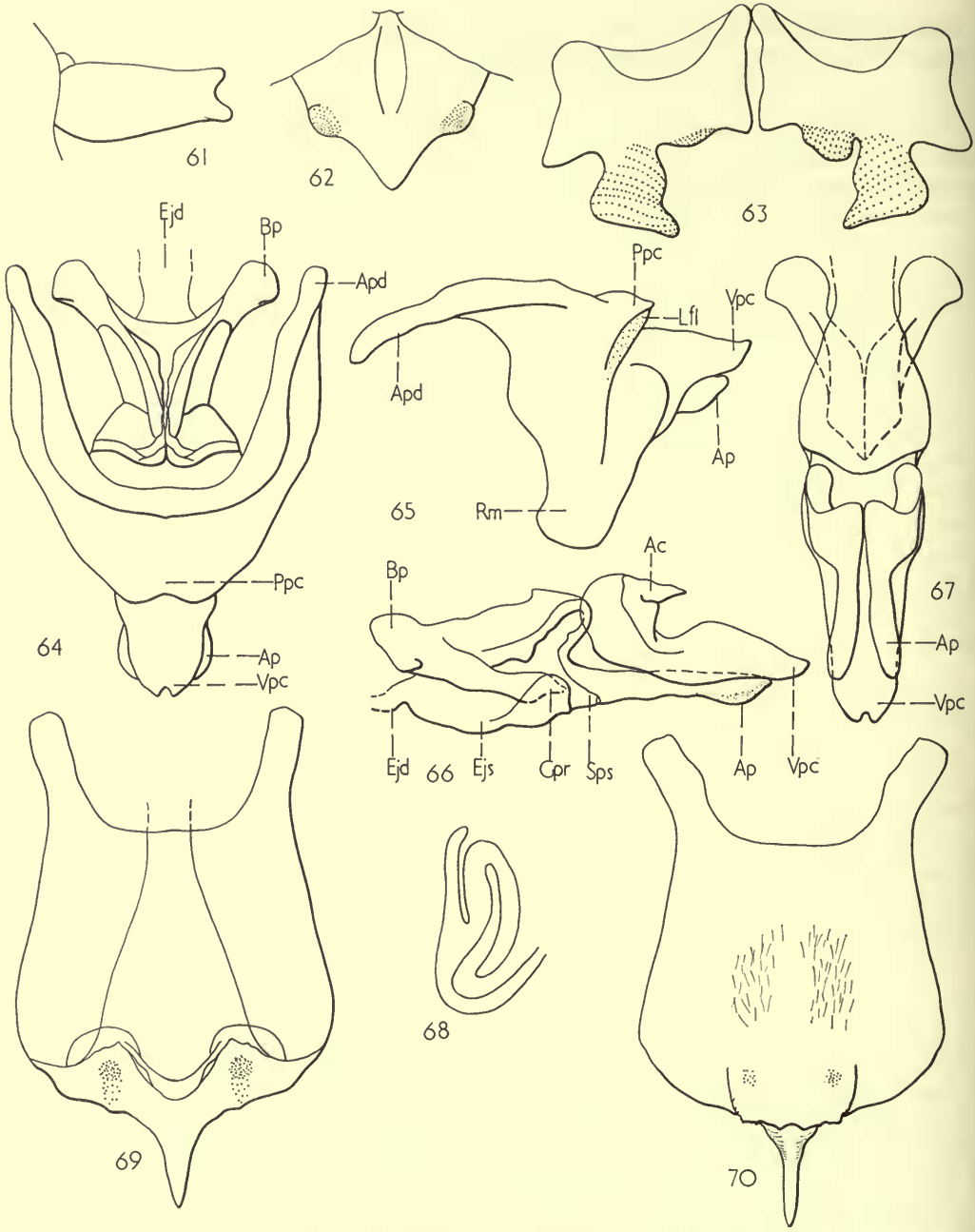
Gryllus fuscovittatus Marschall; Kirby, 1910: 586

Oxya turanica Uvarov, 1912: 28. 3 ♂ and 3 ♀ syntypes, U.S.S.R., 'Transcaspia: Farab ad fl. Amu-Darja, 20–26. viii. 1911 (A. Holbeck leg).' (ZI, Leningrad or Zoological Museum of the Moscow University.) [Synonymized by Willemse, 1925: 23].

Oxya turanica Uvarov; I. Bolívar, 1918: 17.

Oxya oryzivora Willemse, 1925: 25, figs 18, 19. Holotype ♀, INDIA, 'Godwari Dist. Samalcot, on paddy, 10/29. xi. 1921, Y. R. Rao coll.' (BMNH), [examined]. **Syn. n.**

Oxya uvarovi Willemse, 1925: 27, figs 23–25. Holotype ♂, PAKISTAN (WEST), 'N.W. India: Peshawar Distr., Taru, 17–21.x.1914, on sugar cane, Fletcher coll.' (BMNH), [examined]. **Syn. n.**



FIGS 61–70. *Oxya fuscovittata* (Marschall), terminalia and genitalia; male, 61, cercus, lateral view; 62, supra-anal plate, dorsal view; 63, epiphallus; 64, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 65, cingulum, lateral view; 66, endophallus, lateral view; 67, same, ventral view; female, 68, spermatheca; 69, subgenital plate, dorsal view; 70, same, ventral view.

Oxya uvarovi f. *brachyptera* Willemse, 1925: 29.
Oxya fuscovittata (Marschall) Uvarov, 1926: 46.
Oxya uvarovi Willemse; Uvarov, 1926: 47.
Oxya fuscovittata (Marschall); Mishchenko, 1951: 164, figs 274, 277.
Oxya fuscovittata (Marschall); Mishchenko, 1952: 148, figs 209, 212.
Oxya uvarovi Willemse; Bullen and MacQuaig, 1969: 398.
Oxya fuscovittata (Marschall); Tandon and Shishodia, 1969: 266.

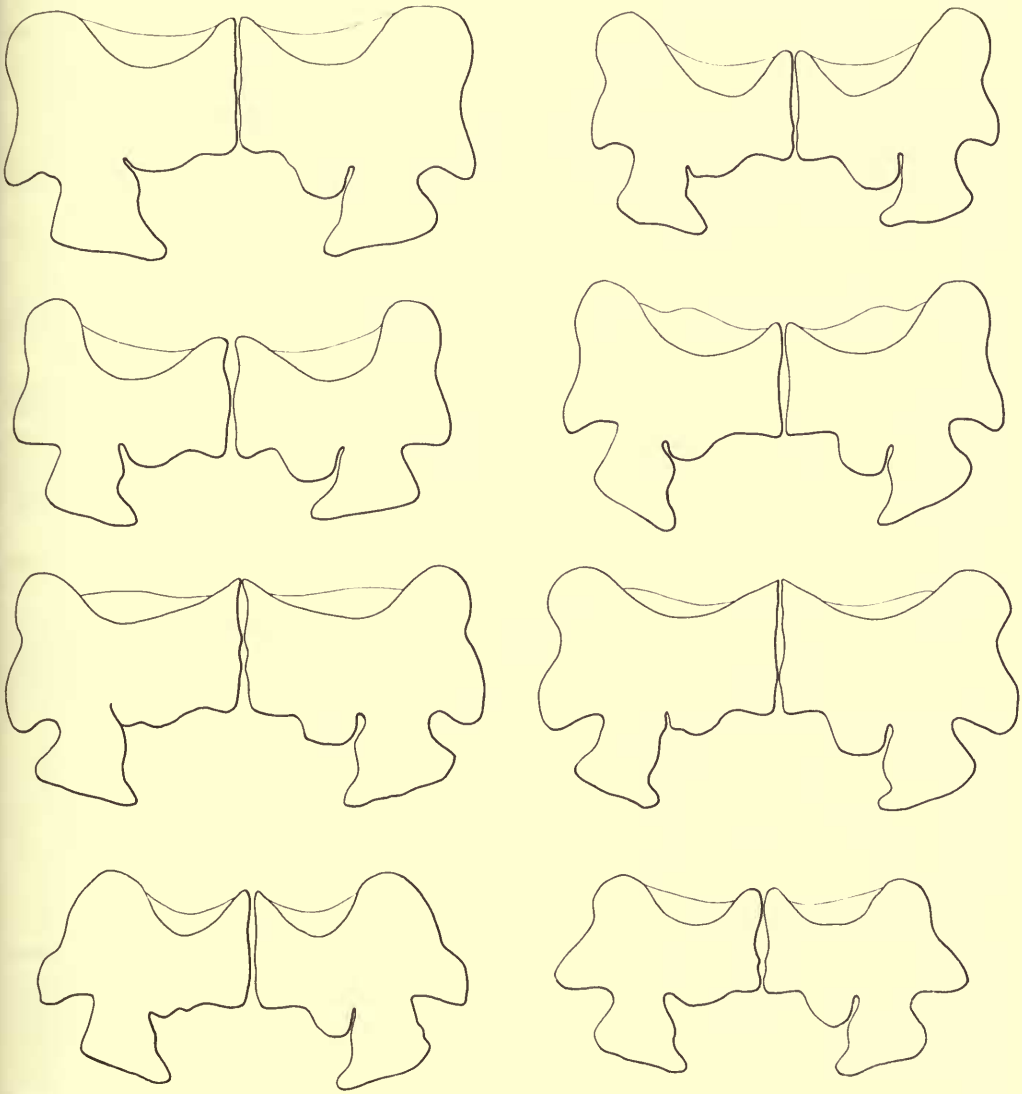


FIG. 71. *Oxya fuscovittata* (Marschall), silhouettes of epiphalli from random sample showing variations in shape of inner lophi.

Diagnosis. ♂. Integument finely pitted and shiny. Antenna with 26–28 segments, as long as or slightly longer than the combined lengths of head and pronotum, interocular distance slightly narrower than frontal ridge at median ocellus. Pronotum with dorsum flattened, parallel-sided. Tegmen fully developed. Supra-anal plate (Text-fig 62) similar to that of *O. hyla* but the lateral tubercles are more pronounced and the posterior lobe slightly less developed; cercus (Text-fig. 61) strongly compressed, hardly or not at all narrowing apically, apex strongly truncate or almost bifid. Epiphallus (Text-figs 63, 71) with narrow bridge, without ancorae, and with boot-shaped outer lophi and tooth-like lophi; of the latter the left lophus is always less developed than the right (Text-fig. 71). Rest of phallic complex as in Text-figs 64–67; lateral fleshy lobes not visible from above, valvular plate of cingulum with shallow but well defined emargination, apical valves of penis of moderate length and thickness.

♀. Larger and more robust than male. Antenna slightly shorter than combined lengths of head and pronotum. Interocular distance slightly wider than frontal ridge at median ocellus. Anterior margin of tegmen weakly spined. Spermatheca as in Text-fig. 68. Valves of ovipositor (Text-figs 22–24) with tooth-like marginal spines; posterior ventral basivascular sclerite with small spines on inner ventral margin (Text-fig. 24); subgenital plate (Text-figs 69, 70) with very broadly flattened ventral surface; posterior margin emarginates medially, straight, or with two very small medial spines.

Measurements (mm) – Length of body, ♂ 17·0–26·9, ♀ 22·1–35·1; pronotum, ♂ 3·7–5·8, ♀ 4·5–7·4; tegmen, ♂ 15·2–21·4, ♀ 12·6–28·0; hind femur, ♀ 10·3–15·3, ♀ 13·5–20·2; maximum width of hind femur, ♀ 2·2–3·3, ♂ 2·6–4·0; mean ratio of length of tegmen to pronotum (E/P), ♂ 3·18, ♀ 3·43; mean ratio of length of tegmen to hind femur (E/F), ♂ 1·44, ♀ 1·31; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·63, ♀ 4·73.

Discussion. The form of the ♂ supra-anal plate, cercus and phallic complex, and the ♀ tegmen, subgenital plate and ovipositor suggest this species is very close to the *hyla-intricata* complex. It may be distinguished from *O. hyla* by the extremely broad male cercus and the short, tooth-like spine on the valves of the female ovipositor.

Biological and economic references to this species may be found in Mishchenko (1951 and 1952) and Bullen and MacQuaig (1969).

Synonymy. Willemse (1925) synonymized *O. turanica* Uvarov with *O. fuscovittata* and Uvarov (1926) agreed with this synonymy. I have not seen Uvarov's type-series but, from the literature and the specimens identified as *O. turanica* by Uvarov in the BMNH, it is clear that Willemse's synonymy should be accepted.

After examination of further material from South and North India and Afghanistan, it seems that the characters used by both Willemse (1925) and Uvarov (1926) to separate *O. oryzivora* and *O. fuscovittata*, i.e. respectively, the degree of serration of the anterior margin of the female tegmen, and the form of the female subgenital plate, are not valid, and the above synonymy is made.

O. uvarovi Willemse was described from a male holotype from W. Pakistan and further paratypes from various localities in N. E. and N. W. India, and Mauritius. I have not examined this last specimen but in all probability it is not conspecific with the type and should be identified as *O. hyla*. Uvarov (1926) expressed doubts about the validity of *O. uvarovi* and it is now confirmed as a synonym of O. *fuscovittata*.

Distribution (Text-fig. 72). Countries and months of capture from 52 specimens examined.

USSR (South-West): July, September; AFGHANISTAN: September, October; KASHMIR: July, September; W. PAKISTAN: September, October; INDIA: July through to January, April.

Oxya minuta Carl, 1916

(Text-figs 72–82)

Oxya minuta Carl, 1916: 472. LECTOTYPE ♂, JAVA, 'Zehntner, Java' (MNH, Geneva), here designated [examined].
Oxya minuta Carl; Willemse, 1925: 16, figs 4, 5.
Oxya minuta Carl; Kalshoven and Van der Vecht, 1950: 108.
Oxya minuta Carl; Willemse, 1955: 147.

DIAGNOSIS. ♂. Integument finely pitted and shiny. Antenna with 24 segments, shorter than combined lengths of head and pronotum. Interocular distance of the same width as the frontal ridge at median ocellus. Dorsum of pronotum slightly flattened, with almost parallel sides, posterior margin of metazona rounded. Tegmina shortened, hardly reaching middle of abdomen but touching each other along dorsal mid line. Supra-anal plate (Text-fig. 74) with a

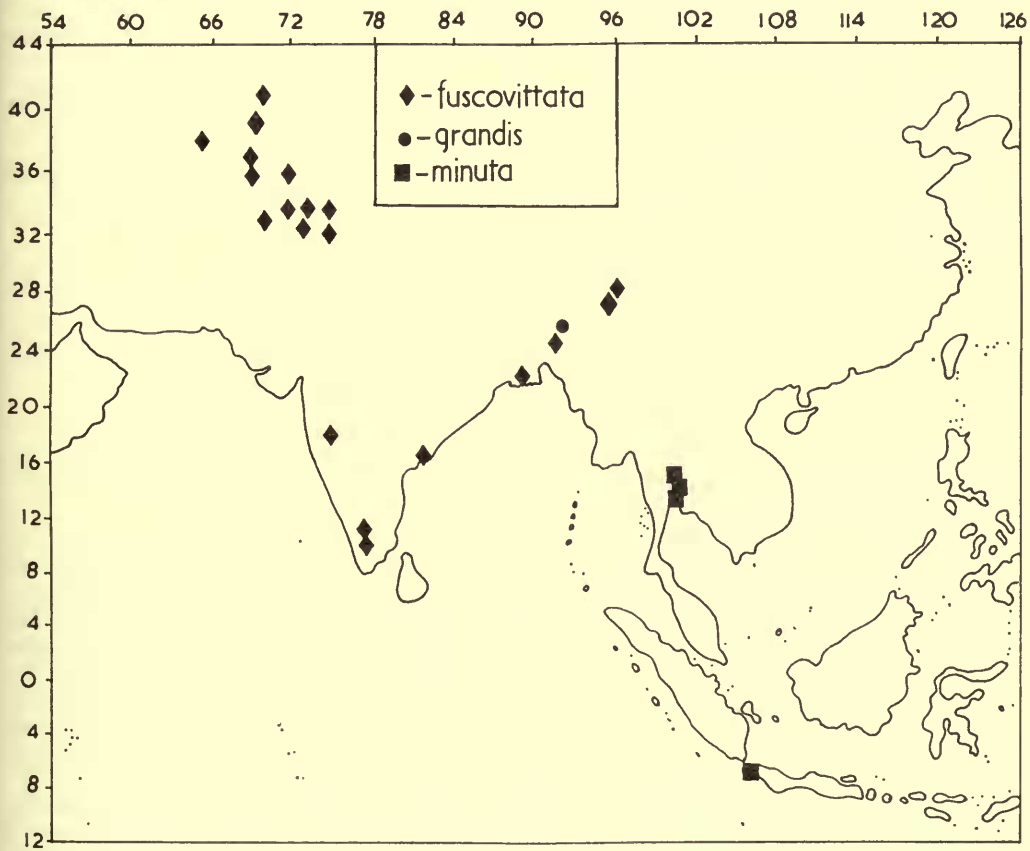


FIG. 72. *Oxya* spp., distribution map.

triangular apical lobe; cercus (Text-fig. 73) subconical, with rounded apex, Epiphallus (Text-fig. 75) with narrow bridge, without ancorae, with boot-shaped outer lophi and large, tooth-like inner lophi, rest of phallic complex as in Text-figs 76–78; lateral fleshy lobes large and visible from above, valvular plate of cingulum without posterior emargination, apical valves of penis of moderate length.

♀. Larger and more robust than ♂. Antenna slightly shorter. Interocular distance wider than frontal ridge at median ocellus. Anterior margin of tegmen without spines. Spermatheca as in Text-fig. 79; valves of ovipositor (Text-fig. 82) with tooth-like spines, posterior ventral basivascular sclerite without spines on inner ventral margin, ventral surface of subgenital plate (Text-fig. 80) with very weak, short, lateral longitudinal ridges in apical third, median pair of spines on posterior margin fairly widely spaced apart.

Measurements (mm) – Length of body, ♂ 15·6–19·2, ♀ 19·4–25·40; pronotum, ♂ 3·3–4·4, ♀ 4·2–5·8; tegmen, ♂ 4·7–6·9, ♀ 5·8–7·6; hind femur, ♂ 9·4–12·0, ♀ 11·8–14·5; maximum width of hind femur, ♂ 2·2–2·5, ♀ 2·5–3·1; mean ratio of length of tegmen to pronotum (E/P), ♂ 1·42, ♀ 1·37; mean ratio of length of tegmen to hind femur (E/F), ♂ 0·52, ♀ 0·49; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·49, ♀ 4·64.

Discussion. The form of the male phallic complex and trilobate supra-anal plate and the female ovipositor suggest this species is related to *O. fuscovittata* (Marschall) but it is easily distinguished by its small size, short tegmina and bluish green hind tibia. It could be confused with *O. diminuta* Walker but the latter species has bright red hind tibia.

Biological and economic references to this species may be found in Kalshoven and Van der Vecht (1950).

Distribution (Text-fig. 72). Countries and months of capture, from 24 specimens examined.

Thailand; June, July, September; Java: January.

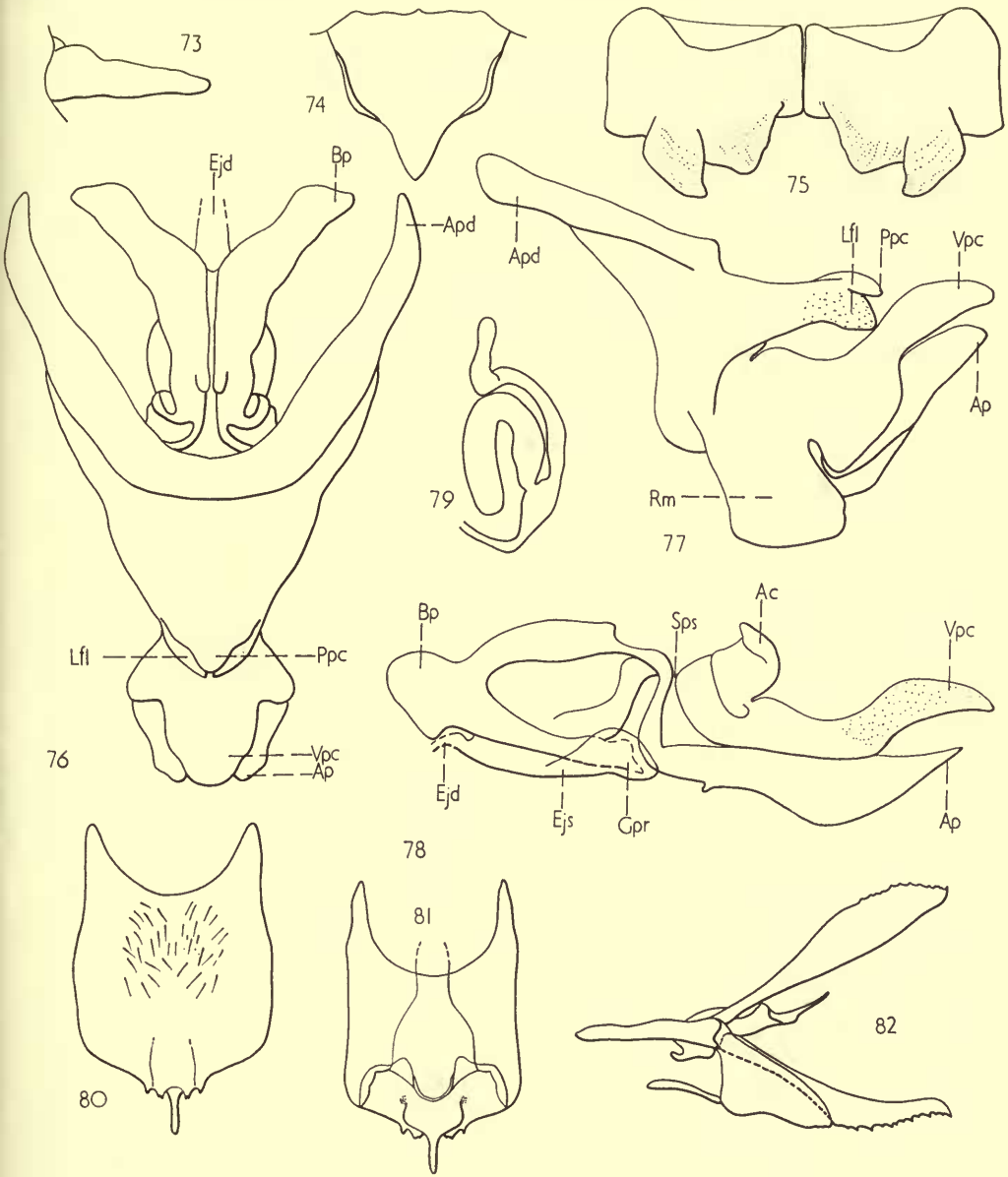
Oxya grandis Willemse, 1925

(Text figs 26, 72, 83–93)

Oxya grandis Willemse, 1925: 36, figs 34, 35. Holotype ♂, India, 'Brahmaputra River, Goal undo-Gauhati, July, 1919, Fletcher'. (BMNH) [examined].
Oxya grandis grandis Willemse; Chang, 1934: 192.

Diagnosis. ♂. Large species. Integument finely pitted and shiny. Antenna with 26 segments, longer than combined lengths of head and pronotum. Interocular distance narrower than frontal ridge at median ocellus. Dorsum of pronotum flattened, with parallel sides; posterior margin of metazona obtuse-angular. Tegmen fully developed. Supra-anal plate (Text-fig. 84) with broadly triangular posterior lobe; cercus (Text-fig. 83) with bifurcate apex, the upper lobe rounded. Epiphallus (Text-fig. 85) with narrow bridge, without ancorae, with hook-like outer lophi and broad, tooth-like inner lophi; rest of phallic complex as in Text-figs 86–89; lateral fleshy lobes small, not visible from above, valvular plate of cingulum with narrow but deep posterior emargination; apical valves of penis fairly long, narrow.

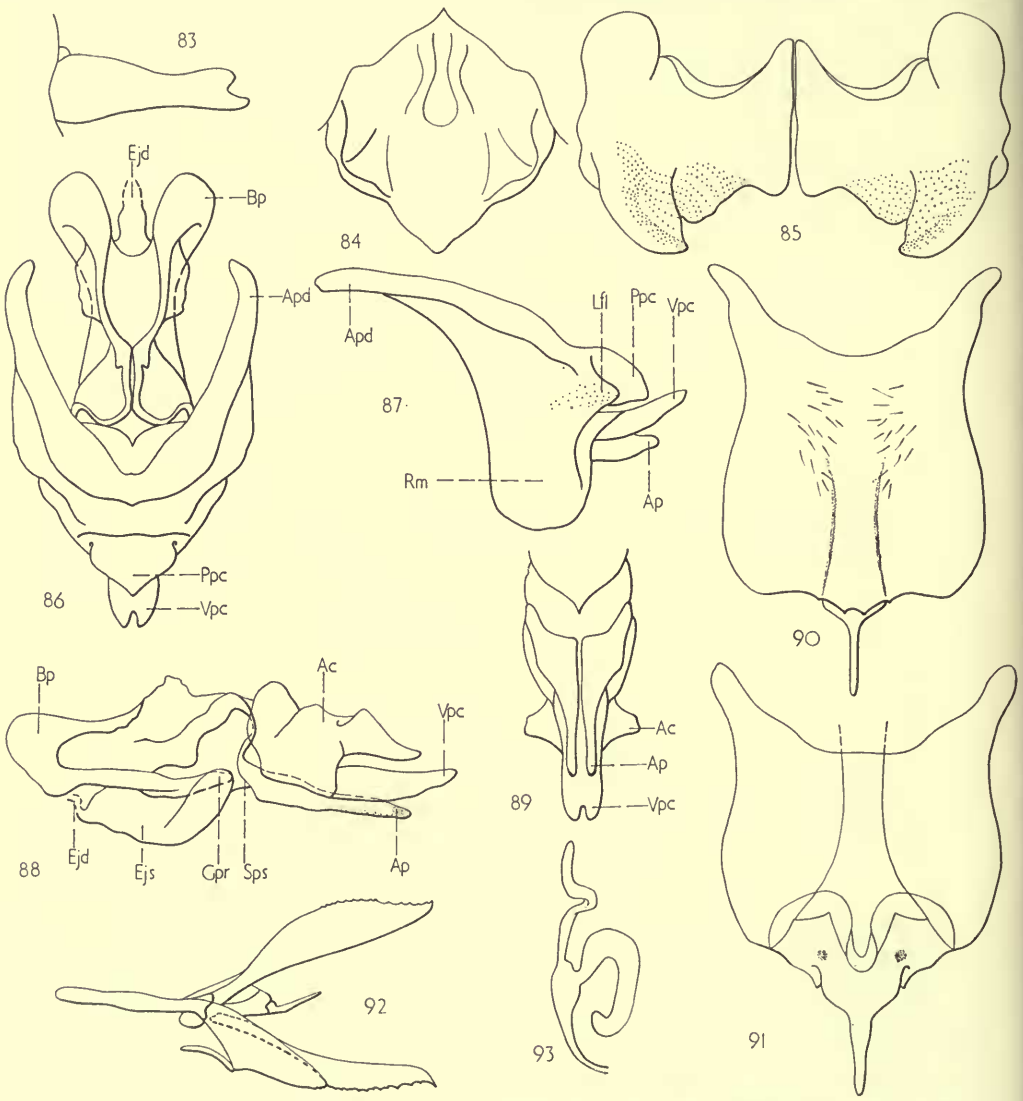
♀. Larger and more robust than ♂. Antenna only as long as combined lengths of head and pronotum. Interocular distance as wide as frontal ridge at median ocellus. Anterior margin of tegmen without spines. Spermatheca as in Text-fig. 93; valves of ovipositor (Text-fig. 92) with tooth-like spines; posterior ventral basivascular sclerite without spines on inner ventral



FIGS 73–82. *Oxya minuta* Carl, terminalia and genitalia; male, 73, cercus, lateral view; 74, supra-anal plate, dorsal view; 75, epiphallus; 76, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 77, cingulum, lateral view; 78, endophallus, lateral view; female, 79, spermatheca; 80, subgenital plate, ventral view; 81, same, dorsal view; 82, ovipositor, lateral view.

margin; ventral surface of subgenital plate (Text-fig. 90) with a long median concavity bordered on each side by a well developed lateral longitudinal ridge, posterior margin with a pair of small, closely spaced median spines.

Measurements (mm) – Length of body, ♂ 37·3, ♀ 37·5; pronotum, ♂ 6·6, ♀ 8·1; tegmen, ♂ 29·5, ♀ 33·9; hind femur, ♂ 19·7, ♀ 22·3; ratio of length of tegmen to pronotum (E/P), ♂ 4·47,



Figs 83–93. *Oxya grandis* Willemse, terminalia and genitalia; male, 83, cercus, lateral view; 84, supra-anal plate, dorsal view; 85, epiphallus; 86, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 87, cingulum, lateral view; 88, endophallus, lateral view; 89, apex of penis, ventral view; female, 90, subgenital plate, ventral view; 91, same, dorsal view; 92, ovipositor, lateral view; 93, spermatheca.

♀ 4·19; ratio of length of tegmen to hind femur (E/F), ♂ 1·49, ♀ 1·52; ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·69, ♀ 4·96.

Discussion. *O. grandis* Willemse has not been recorded since its original description and seems to be rare. It is recognizeable by its large size, the structure of the male supra-anal plate, cercus and phallic complex, and the female subgenital plate. The lobate male supra-anal plate and the form of the phallic complex would suggest a close relationship between this species and *O. fuscovittata* and the *hyla-intricata* complex, while the female ovipositor and subgenital plate are similar in structure to those of *O. velox*.

Synonymy. Chang (1934) divided this taxon into two subspecies when he described *O. grandis ningpoensis* from Ningpo, China. As mentioned below, *O. ningpoensis* Chang is regarded here as a distinct species and *O. grandis* may now revert to being a monotypic species.

Distribution (Text-fig. 72). Known only from the type-series.

Oxya velox (Fabricius, 1787)

(Text-figs 94–105)

Gryllus velox Fabricius, 1787: 239. LECTOTYPE ♀, 'China' (UZM, Copenhagen), here designated [examined].

Gryllus squalidus Marschall, 1836: 213, pl. 18, fig. 5. Holotype ♂, probably N. India [not Brazil as stated by Marschall] (NM, Vienna) [examined]. **Syn. n.**

Heteracris apta Walker, 1870: 666. Holotype ♀, India, 'a. Silhet' (BMNH) [examined]. **Syn. n.**

Oxya velox (Fabricus) Kirby, 1910: 393, partim.

Gryllus squalidus Marschall; Kirby, 1910: 586.

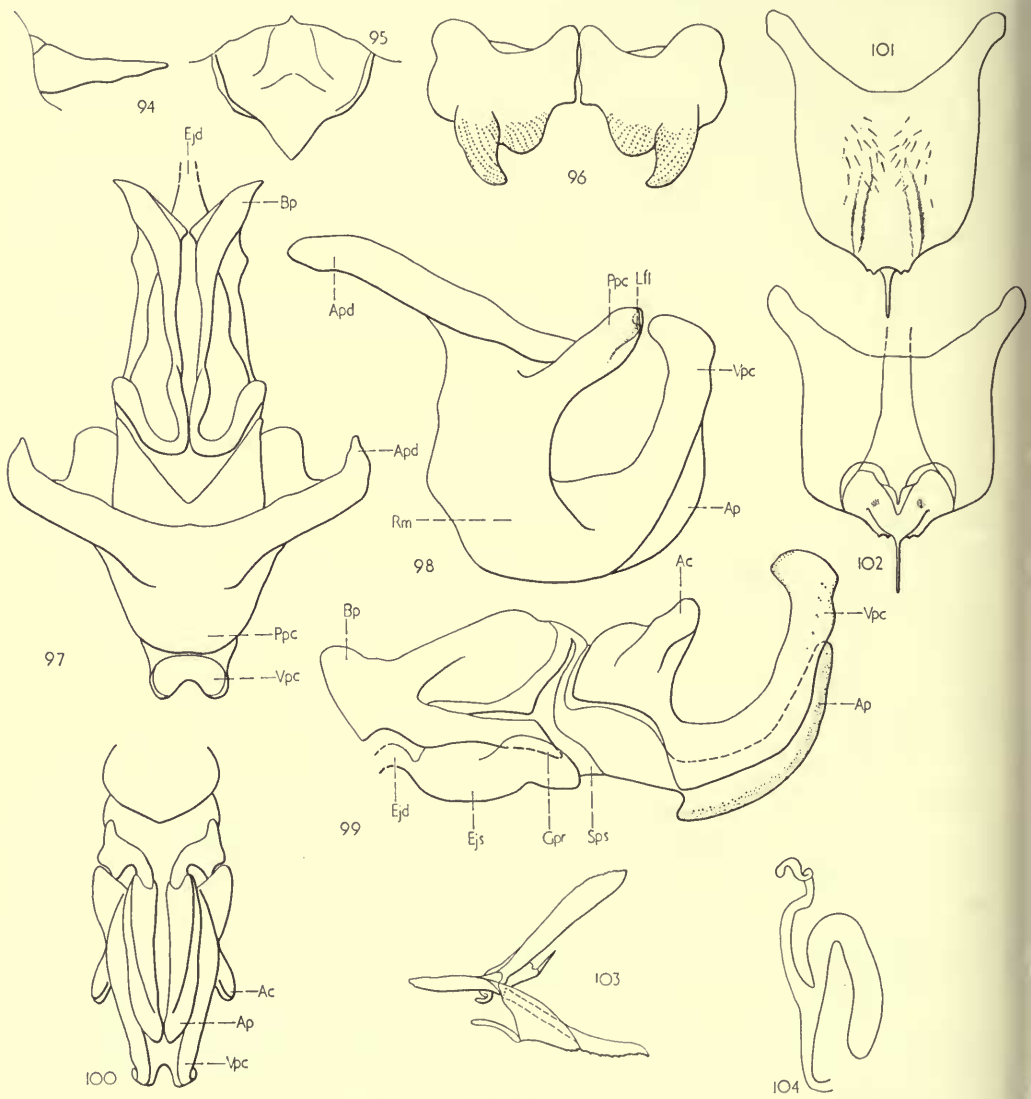
Oxya velox (Fabricius); Kirby, 1914: 199, fig. 116, partim.

Oxya squalida (Marschall) Willemse, 1925: 58, fig. 65.

Type-data. Zimsen (1964) in her discussion of Fabricius's type-material states, for *Gryllus velox* 'Copenhagen, 3 specimens'. I have received two specimens a male and female, from UZM, Copenhagen. The female bears the following labels: a small green square; a red label with the word 'Type' handwritten on it; a buff label bearing the handwritten data 'China Pflug Mus. Sch. e T.L.'; and lastly a label in C. Willemse's handwriting '*Oxya velox* Fabr. (= *vicina* Br. v. W.)' and in another hand 'C. Willemse det'. The male bears a small green label; a red label with the handwritten word 'Type'; and a buff label with the handwritten legend 'China Pflug Mus. S. and T.L. *Gryllus velox* F.' It seems that both these specimens are part of Fabricius's type-series as they agree with his data 'Habitat in China D. Pflug', and as Willemse obviously regarded the female as the type I am formally designating this specimen as the LECTOTYPE of *Gryllus velox* Fabricius. The male specimen I have examined is not the same species and is identified as *Oxya hyla intricata* (Stål).

It is interesting to note that Willemse (1955) in his discussion of *O. velox* (here =

O. chinensis) mentions under type-data 'China, probably lost'. The reason for this statement is obscure as he clearly saw the type-material before publication of his revision of the genus (1925).



FIGS 94–104. *Oxya velox* (Fabricius), terminalia and genitalia; male, 94, cercus, lateral view; 95, supra-anal plate, dorsal view; 96, epiphallus; 97, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 98, cingulum, lateral view; 99, endophallus, lateral view; 100, apex of penis, ventral view; female, 101, subgenital plate, ventral view; 102, same, dorsal view; 103, ovipositor, lateral view; 104, spermatheca.

Diagnosis. ♂. Integument finely pitted and shiny. Antenna with 22–26 segments, as long as combined lengths of head and pronotum. Interocular distance as wide as frontal ridge at median ocellus. Dorsum of pronotum slightly flattened and slightly narrowing forwards, posterior margin of metazona widely obtuse-angular. Tegmen fully developed. Supra-anal plate (Text-fig. 95) with rounded triangular posterior projection; cercus (Text-fig. 94) conical, with subacute apex. Epiphallus (Text-fig. 96) with narrow bridge, without ancorae, with hook-like outer lophi and large, tooth-like inner lophi; rest of phallic complex as in Text-figs 97–100; lateral fleshy lobes small, not visible from above; valvular plate of cingulum very large, upcurved and rolled almost into a cylinder, apex enlarged; apical valves of penis long, slender, upcurved, almost completely enclosed within the valvular plate of cingulum.

♀. Larger and more robust than ♂. Antenna shorter than combined lengths of head and pronotum. Interocular distance wider than frontal ridge at median ocellus. Tegmen weakly spined. Spermatheca as in Text-fig. 104; valves of ovipositor (Text-fig. 103) with tooth-like spines; posterior ventral basivalvular sclerite without spines on inner ventral margin; ventral surface of subgenital plate (Text-fig. 101) in posterior half with a median longitudinal concavity bordered on each side by a lateral longitudinal ridge; median pair of spines on posterior margin widely spaced.

Measurements (mm) – Length of body, ♂ 17·8–26·3, ♀ 22·9–29·6; pronotum, ♂ 3·7–5·7, ♀ 5·2–6·7; tegmen, ♂ 14·3–22·6, ♀ 16·6–27·2; hind femur, ♂ 10·3–15·5, ♀ 14·8–18·8; maximum width of hind femur, ♂ 2·3–3·3, ♀ 3·0–3·8; mean ratio of length of tegmen to pronotum (E/P), ♂ 3·90, ♀ 3·65; mean ratio of length of tegmen to hind femur (E/F), ♂ 1·37, ♀ 1·33; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·74, ♀ 4·85.

Discussion. When Willemse (1925) examined the type of *Gryllus velox* Fabricius he clearly misinterpreted the characters on the female subgenital plate and ovipositor and referred it to the species regarded here as *O. chinensis* (Thunberg), recording it from various localities in S. E. China, Formosa and Japan.

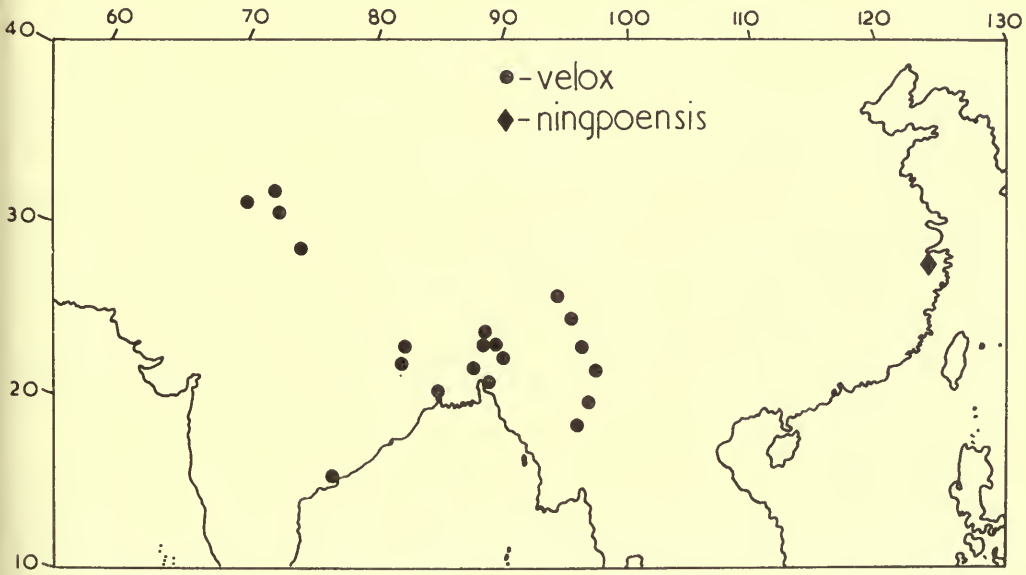


Fig. 105. *Oxya* spp., distribution map.

O. velox is a relatively poorly known species, restricted in its distribution to India, W. and E. Pakistan, Upper Burma and the Tibetan Himalayas.

The form of the male supra-anal plate and phallic complex and the female ovipositor and subgenital plate suggest *velox* is closely related to *O. ningpoensis* Chang and less closely to *O. grandis* and the *hyla-intricata* complex. It may be readily identified by the extraordinary development of the valvular plate of the cingulum in the male and the form of the subgenital plate and posterior ventral basivalvular sclerite of the ovipositor in the female.

Synonymy. *Gryllus squalidus* Marschall was described from a single male, deposited in NM, Vienna, and bears the following labels: a handwritten label 'Marschall Type XVIII/5', and a 'Mus. Caes. Vind.' label with the handwritten legend '*Oxya squalida* Marsch. Type!' Structurally this specimen agrees very well with other material of the same sex from India which is regarded here as *O. velox.*

Apart from its somewhat smaller size, Walker's type of *H. apta* agrees very well with the type of *O. velox* . Kirby(1914) synonymized *O. apta* with *O. velox* but it is clear from the BMNH collections that Kirby's interpretation of *O. velox* included, besides this species, *O. japonica* (Thunberg) and possibly other species.

Distribution (Text-fig. 105). Countries and months of capture, from 42 specimens examined.

W. Pakistan: May, October; Kashmir: August; India: March, April, June to August, October, November; E. Pakistan: May, August to October; Burma: September to December; China: no dates; Thailand: March.

Oxya ningpoensis Chang, 1934 **stat. n.**

(Text-figs 105–116)

Oxya grandis ningpoensis Chang, 1934: 190, figs 1–3. 10 ♂ and 7 ♀ syntypes, China, 'Ningpo, Chekiang, China, vii. 1934 (Chang)' [most of series not traced but 1 ♂ and 1 ♀ bearing Chang's original 'paratype' labels examined in BMNH.

Diagnosis. ♂. Large, robust species. Integument finely pitted and shiny. Antenna longer than combined lengths of head and pronotum. Interocular distance wider than frontal ridge at median ocellus. Dorsum of pronotum hardly flattened, parallel-sided, posterior margin of metazona rounded. Tegmen fully developed but not reaching to apex of hind femur. Supra-anal plate (Text-fig. 107) with a rounded triangular posterior lobe; cercus (Text-fig. 106) with bilobate apex, the upper lobe rounded. Epiphallus (Text-fig. 108) with narrow bridge, without ancorae, with hook-like outer lophi and large tooth-like inner lophi; rest of phallic complex as in Text figs. 109–112 lateral fleshy lobes small, not visible from above; valvular plate of cingulum short, fleshy, with complicated folds; apical valves of penis similar, fleshy and folded.

♀. Larger and more robust than ♂. Anterior margin of tegmen without spines. Spermatheca as in Text-fig. 115; valves of ovipositor (Text-fig. 116) with toothlike spines, posterior ventral basivalvular sclerite of ovipositor without spines on its inner ventral margin; ventral surface of subgenital plate (Text-fig. 113) with a median concavity in posterior half which is bordered laterally by weak longitudinal ridges, median pair of spines on posterior margin widely spaced.

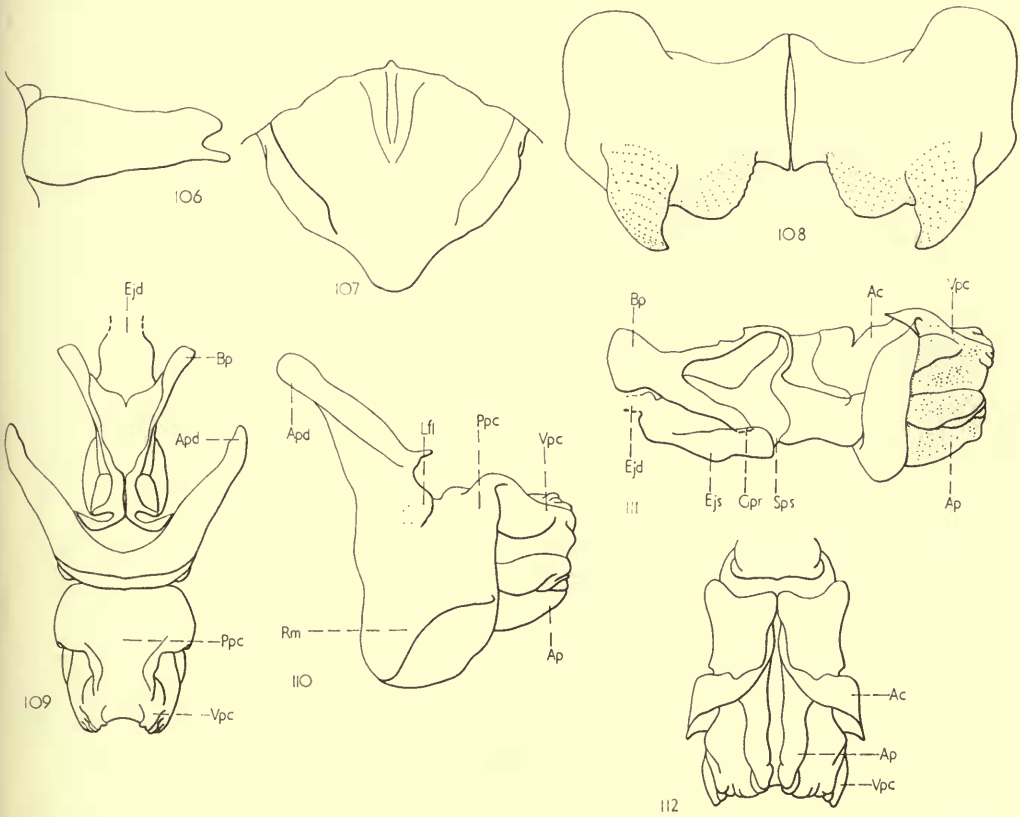
MEASUREMENTS (mm) – Length of body, ♂ 35·8, ♀ 41·5; pronotum, ♂ 7·9, ♀ 9·8; tegmen, ♂ 23·6, ♀ 25·8; hind femur, ♂ 20·1, ♀ 23·6; maximum width of hind femur, ♂ 4·3, ♀ 5·2; ratio of length of tegmen to pronotum (E/P), ♂ 2·99, ♀ 2·63; ratio of length of tegmen to hind femur (E/F), ♂ 1·12, ♀ 1·09; ratio of length of hind femur to its maximum width (FL/FW), ♂, 4·91, ♀ 4·54.

DISCUSSION. The form of the male phallic complex and female subgenital plate and ovipositor would suggest this species is closely related to *O. velox*, but the convoluted and fleshy valvular plate of the cingulum and apical penis valves are unique in this genus.

DISTRIBUTION (Text-fig. 105). Known only from type-series.

Oxya japonica (Thunberg, 1824)

This species is divided into two subspecies.



FIGS 106–112. *Oxya ningpoensis* Chang, male terminalia and genitalia; 106, cercus, lateral view, 107, supra-anal plate, dorsal view; 108, epiphallus; 109, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 110, cingulum, lateral view; 111, endophallus, lateral view; 112, apex of penis, ventral view.

Oxya japonica japonica (Thunberg, 1824)

(Text-figs 117–121, 123–133, 138)

Gryllus japonicus Thunberg, 1824: 429. Holotype ♀, Japan, '*japonicus* Japonica' (ZIUU, Uppsala) [examined].

Acridium sinense Walker, 1870: 628. Holotype ♀, 'China' (BMNH) [examined]. **Syn. n.**

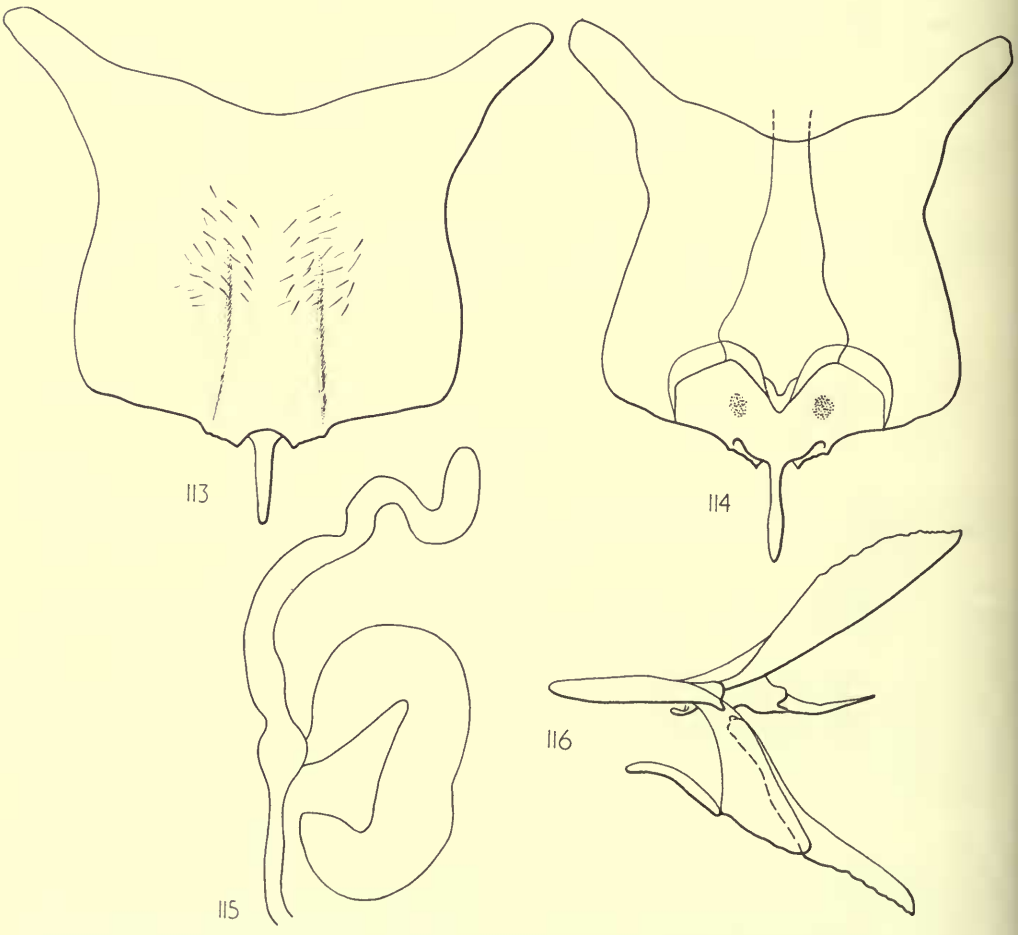
Heteracris straminea Walker, 1870: 666. Holotype ♀, 'China' (BNMH) [examined]. **Syn. n.**

Heteracris simplex Walker, 1870: 669. Holotype ♀, 'Philippine Is.' (BMNH) [examined]. **Syn. n.**

[*Oxya chinensis* (Thunberg); Stål, 1873: 82. var *a* and *c*. Misidentification.]

Oxya lobata Stål, 1877: 53. Holotype ♀, Philippine Is., 'Ins. Philipp.' (NR, Stockholm) [examined]. **Syn. n.**

[*Oxya velox* (Fabricius); Brunner von Wattenwyl, 1893: 152, partim. Misidentification.]

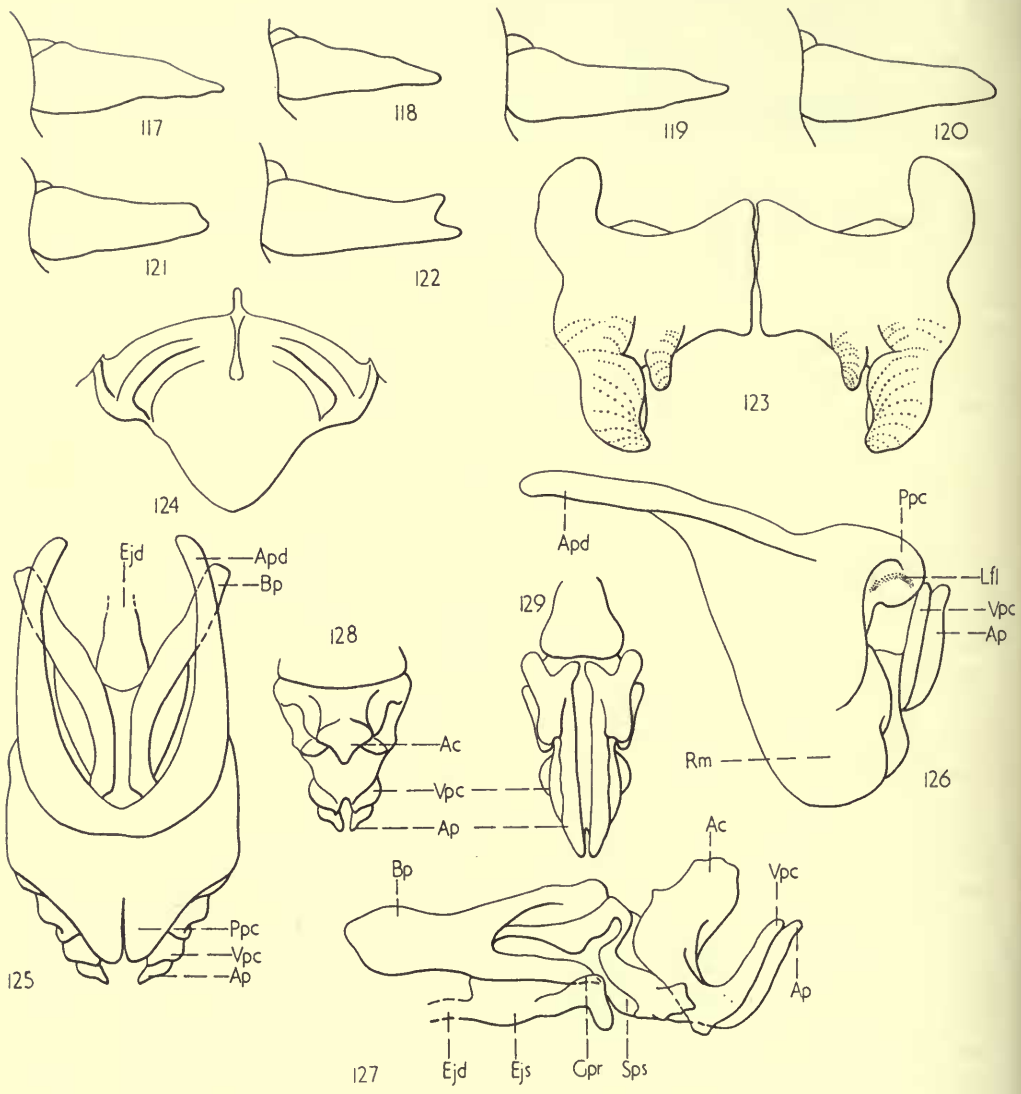


Figs 113–116. *Oxya ningpoensis* Chang, female; 113, subgenital plate, ventral view; 114, same, dorsal view; 115, spermatheca; 116, ovipositor, lateral view.

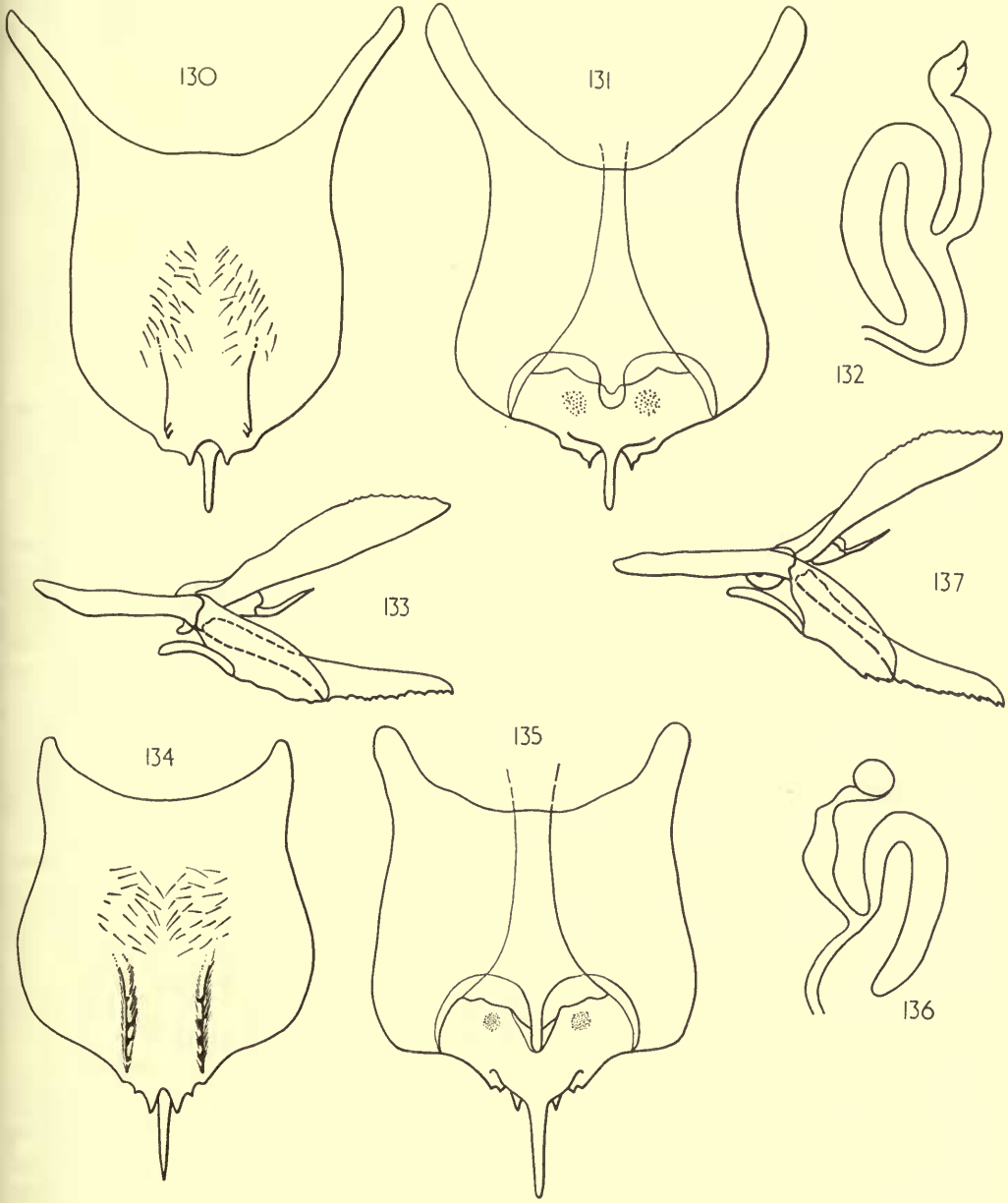
[*Oxya velox* (Fabricius); Kirby, 1910: 393, partim. Misidentification.]
[*Oxya velox* (Fabricius); Kirby, 1914: 199, partim. Misidentification.]
[*Oxya velox* (Fabricius); I. Bolívar, 1918: 15, partim. Misidentification.]
Oxya asinensis Willemse, 1925: 32, figs 29, 30. Holotype ♀, INDIA, 'Malabar Dt., Periya Ghat, 2,500', 6.x.17, T.V.R. Coll.' (BMNH) [examined]. **Syn. n.**
Oxya rufostriata Willemse, 1925: 33, fig. 31. Holotype ♀, INDIA, 'Adderley, 28.ix.1921, Susainathan coll.' (BMNH) [examined]. **Syn. n.**
[*Oxya sinensis* (Walker), Willemse, 1925: 49, figs 54–57. Misidentification.]
Oxya sinensis f. *robusta* Willemse, 1925: 52.
[*Oxya sinensis* f. *lobata* Stål; Willemse, 1925: 52, fig. 55. Misidentification.]
[*Oxya chinensis* (Thunberg); Uvarov, 1926: 48. Misidentification.]
[*Oxya velox* (Fabricius); Swezey, 1926: 378, figs 1–4. Misidentification.]
[*Oxya chinensis* (Thunberg); Uvarov, 1928: 318, fig. 115 c. Misidentification.]
[*Oxya chinensis* (Thunberg); Willense, 1930: 123, figs 62, 63. Misidentification.]
[*Oxya gavisa* (Walker); Willemse, 1931: 239. Misidentification.]
[*Oxya chinensis* (Thunberg); Willemse, 1931: 240. Misidentification.]
[*Oxya chinensis* (Thunberg); Pemberton, 1933: 251. Misidentification.]
[*Oxya chinensis* (Thunberg); Pemberton, 1933a: 1253. Misidentification.]
[*Oxya chinensis* (Thunberg); Chang, 1934: 187. Misidentification.]
[*Oxya velox* (Fabricius); Shiraki, 1937: 20. Misidentification.]
[*Oxya formosana* Shiraki; Takano and Yanagihara, 1939: 76. Misidentification.]
[*Oxya chinensis* (Thunberg); Tinkham, 1940: 295. Misidentification.]
[*Oxya chinensis* (Thunberg); Fullaway and Krauss, 1945: 36. Misidentification.]
[*Oxya velox* (Fabricius); Mischenko, 1951: 167, partim, figs 288, 297. Misidentification.]
[*Oxya chinensis* (Thunberg); Mischenko, 1951: 167, partim. Misidentification.]
[*Oxya velox* (Fabricius); Mischenko, 1952: 154, partim, figs 223, 232. Misidentification.]
[*Oxya velox* (Fabricius); Murai, 1954: 1. Misidentification.]
[*Oxya chinensis* (Thunberg); Willemse, 1955: 156, figs 102, A, B. Misidentification.]
[*Oxya velox* (Fabricius); Murai, 1957: 22. Misidentification.]
[*Oxya chinensis* (Thunberg); Pemberton, 1963: 679. Misidentification.]
[*Oxya chinensis* (Thunberg); Meer Mohr, 1965: 103. Misidentification.]
[*Oxya velox* (Fabricius); Fukuhara, 1966: 202. Misidentification.]
[*Oxya chinensis* (Thunberg); Yunus, 1967: 632, Misidentification.]
[*Oxya chinensis* (Thunberg); Bullen and MacQuaig, 1969: 398. Misidentification.]
[*Oxya chinensis* (Thunberg); Grist and Lever, 1969: 285. Misidentification.]

DIAGNOSIS. ♂. Integument finely pitted and shiny. Antenna with 24–26 segments, slightly longer or only as long as combined lengths of head and pronotum. Interocular distance as wide as or slightly narrower than frontal ridge at median ocellus. Dorsum of pronotum slightly flattened, parallel sided. Tegmen fully developed. Supra-anal plate (Text-fig. 124) rounded triangular, with very well developed basal folds; cercus (Text-figs 117–121) conical, with subacute or truncate apex. Epiphallus (Text-fig. 123) with narrow bridge, without ancorae, with hook-like outer lophi and short, slender inner lophi; rest of phallic complex as in Text-figs 125–129; posterior process of cingulum, from above, rounded triangular with deep division posteriorly; valvular plate of cingulum with deep posterior emargination; apical valves of penis long, slender and upcurved.

♀. Larger and more robust than ♂. Interocular distance as wide as or slightly wider than frontal ridge at median ocellus. Anterior margin of tegmen very weakly spined. Spermatheca as in Text-fig. 132; valves of ovipostor (Text-fig. 133) with tooth-like spines; posterior ventral basivalvular sclerite of ovipositor with a large spine on its inner ventral margin; ventral surface of subgenital plate (Text-fig. 130) with a deep median longitudinal concavity posteriorly which is bordered on each side by a well developed lateral longitudinal ridge, latter unspined except at most posterior apex; median pair of spines on posterior margin well developed, fairly closely spaced.



FIGS 117–129. *Oxya japonica* subspp., male terminalia and genitalia; *O. japonica japonica* (Thunberg) 117, cercus, lateral view, of specimen from Ceylon; 118, same, from S. India; 119, same, from Assam; 120, same, from Penang; 121, same, from Hawaii; 123, epiphallus; 124, supra-anal plate, dorsal view; 125, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 126, cingulum, lateral view; 127, endophallus, lateral view; 128, apex of penis, dorsal view; 129, same, ventral view; *O. japonica vitticollis* (Blanchard) 122, cercus, lateral view.



FIGS 130–137. *Oxya japonica* subspp., female; *O. japonica japonica* (Thunberg) 130, subgenital plate, ventral view; 131, same, dorsal view; 132, spermatheca; 133, ovipositor, lateral view; *O. japonica vitticollis* (Blanchard) 134, subgenital plate, ventral view; 135, same, dorsal view; 136, spermatheca; 137, ovipositor, lateral view.

Measurements (mm) – Length of body, ♂ 17·4–33·8, ♀ 20·8–37·4; pronotum, ♂ 3·5–6·7, ♀ 4·7–8·9; tegmen, ♂ 14·1–26·5, ♀ 14·4–33·4; hind femur, ♂ 10·4–18·2, ♀ 12·8–23·2; maximum width of hind femur, ♂ 2·2–3·7, ♀ 2·9–4·7; mean ratio of length of tegmen to pronotum (E/P) ♂ 3·94, ♀ 3·64; mean ratio of length of tegmen to hind femur (E/F), ♂ 1·40, ♀ 1·34 mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·79, ♀ 4·70.

Discussion. *O. japonica japonica* is extremely variable in size, relative length of tegmen and the form of the male cercus. The latter varies almost clinally along the geographical range of the subspecies, being less truncate apically in western populations and more truncate in eastern populations, reaching a climax east of the island of Halmahera in the subspecies *j. vitticollis*.

O. j. japonica may be recognized in the female by the form of the subgenital plate and the spined posterior ventral basivalvular sclerite of the ovipositor, and in the male by the basal folds on the supra-anal plate, the slender inner lophi of the epiphallus and the shape of the posterior process of the cingulum.

Biological and economic references to this subspecies may be found in Swezey (1926), Uvarov (1928), Pemberton (1933, 1933*a*, 1963), Tinkham (1940), Fullaway and Krauss (1945), Murai (1954, 1957), Meer Mohr (1965), Yunus (1967), Bullen and MacQuaig (1969) and Grist and Lever (1969).

Synonymy. Willemse (1925) made no mention of the name *Gryllus japonicus* Thunberg, 1824 and recognized this species as *O. sinensis* (Walker), regarding it as synonymous with *O. chinensis* (Thunberg) var. *a*, as identified by Stål (1873: 82). Stål also considered *G. japonicus* to be a synonym of *O. chinensis* var. *b*. Uvarov (1926) pointed out that if Stål's interpretation was correct then the older name, *viz. O. chinensis* (Thunberg), should be applied to this species.

An examination of Thunberg's type-material has shown that *japonicus* and *chinensis* are distinct species and *sinense* Walker is a synonym of *chinensis*. Under *Gryllus lutescens* in Thunberg's collection are three specimens labelled α, β, and γ which probably correspond to Stål's *O. chinensis* (Thunberg) var. *a*, *b*, and *c*. Mention of these varieties was made in Thunberg's original description but not by specific letter. Var. α and var. γ are synonymous with *japonicus* Thunberg, but for reasons given below neither of these specimens is considered as the lectotype of *G. lutescens* Thunberg.

Distribution. (Text-fig. 138). Countries and months of capture, from 678 specimens examined.

Ceylon: January to March, May; India: April to December; E. Pakistan: October; Burma: July; Andaman Is: February, March, August; China: April, May, July, August, October, December; Taiwan: August; Japan (including Ryuku Is): June, July, October; Thailand: January to March, May to August, November; Vietnam: January, March, September, December; West Malaysia: February, April, July to November; Singapore: March, May, June, Sumatra: February to December; Java: October through to January, March, May, July, August; Bali: no dates; Lombok: March; Sumba: June to September; Timor: March; Philippine Is: January, February, May, July; Palaus Is: March; Borneo:

August through to January, March, April; Celebes: May, July; Sula Is: March, May; Halmahera Is: October; Hawaii Is: January, May, September to November.

Oxya japonica vitticollis (Blanchard, 1853) **stat. n.**

(Text-figs 122, 134–137)

Acridium vitticolle Blanchard, 1853: 373, pl. 1, fig. 10. Holotype ♂, New Guinea, 'Museum Paris. Nouv.-Guinée, Baie Triton, Jacquinot 1841' (MNHN, Paris) [examined].
Acridium vittigerum Blanchard, 1853: 371, pl. 3, fig. 9. Holotype ♀ New Guinea 'Museum Paris. Nouv.-Guinée, Baie Triton, Jacquinot 1841' (MNHN, Paris) [examined]. [Homonym of *Acridium vittigerum* Blanchard, 1851: 73.]
Heteracris gavisa Walker, 1870: 699. Holotype ♂, Maluku, 'Ceram' (BMNH) [examined]. **Syn. n.**
[*Oxya velox* (Fabricius); Brunner von Wattenwyl, 1893: 152, partim. Misidentification.]
[*Oxya velox* (Fabricius); I. Bolívar, 1918: 15, partim. Misidentification.]
[*Oxya velox* (Fabricius); Sjöstedt, 1921: 92. Misidentification.]
Oxya gavisa (Walker) Willemse, 1925: 47, figs 52, 53.
[*Oxya sinensis* (Walker); Sjöstedt, 1935: 71. Misidentification.]
Oxya gavisa aurantiaca Willemse, 1935: 179. Holotype ♂, New Guinea (RNH, Leiden) [examined]. **Syn. n.**
Oxya gavisa (Walker); Willemse, 1955: 155, figs 99, 101.
Oxya gavisa var. *brachyptera* Willemse, 1955: 156. Holotype ♀, New Guinea (RNH, Leiden) [examined]. **Syn. n.**
Oxya gavisa (Walker); Rehn, 1957: 20, pl. 1, figs 3–6, pl. 7, figs 60–63.
[*Oxya velox* (Fabricius); Pemberton, 1963: 679, partim. Misidentification.]
Oxya vittigera (Blanchard) Dirsh, 1965: 40.
Oxya gavisa (Walker); Kevan, 1968: 76.
Oxya gavisa (Walker); Bullen and MacQuaig, 1969: 398, partim.

Diagnosis. Differs from nominate subspecies as follows: ♂. Antenna always much longer than combined lengths of head and pronotum. Cercus (Text-fig. 122) with more truncate apex, almost to bifid condition.

♀. Lateral longitudinal ridges on ventral surface of subgenital plate (Text-fig. 134) bear spines along their length; medial pair of spines on posterior margin of subgenital plate strongly developed and closer together.

Measurements (mm) – Length of body, ♂ 17·0–24·8, ♀ 20·6–34·1; pronotum, ♂ 3·4–5·5, ♀ 4·8–7·5; tegmen, ♂ 7·4–20·3, ♀ 10·4–27·3; hind femur, ♂ 10·4–15·8, ♀ 13·1–20·5; maximum width of hind femur, ♂ 2·1–3·2, ♀ 2·9–4·3; mean ratio of length of tegmen to pronotum (E/P), ♂ 3·33, ♀ 3·14; mean ratio of length of tegmen to hind femur (E/F), ♂ 1·12, ♀ 1·13; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 5·03, ♀ 4·74.

Discussion. As may be expected the geographical line of demarcation between these two subspecies is not absolute. If a line is drawn east of Timor, Sula and Halmahera and west of Buru, then populations to the west of this line are *j. japonica*, and to the east of it are *j. vitticollis;* specimens of the *j. vitticollis* type have been found from Sula Is and those of the *j. japonica* type from New Guinea. Specimens examined from Obi Is appear to be a mixture of the two forms, and the populations on the Hawaiian Islands are a special case as they were introduced artificially.

Synonymy. Prior to the present revision the binomen applied to this taxon was *Oxya vittigera* (Blanchard, 1851), see Dirsh (1965: 40), but for reasons given below this name is not accepted here.

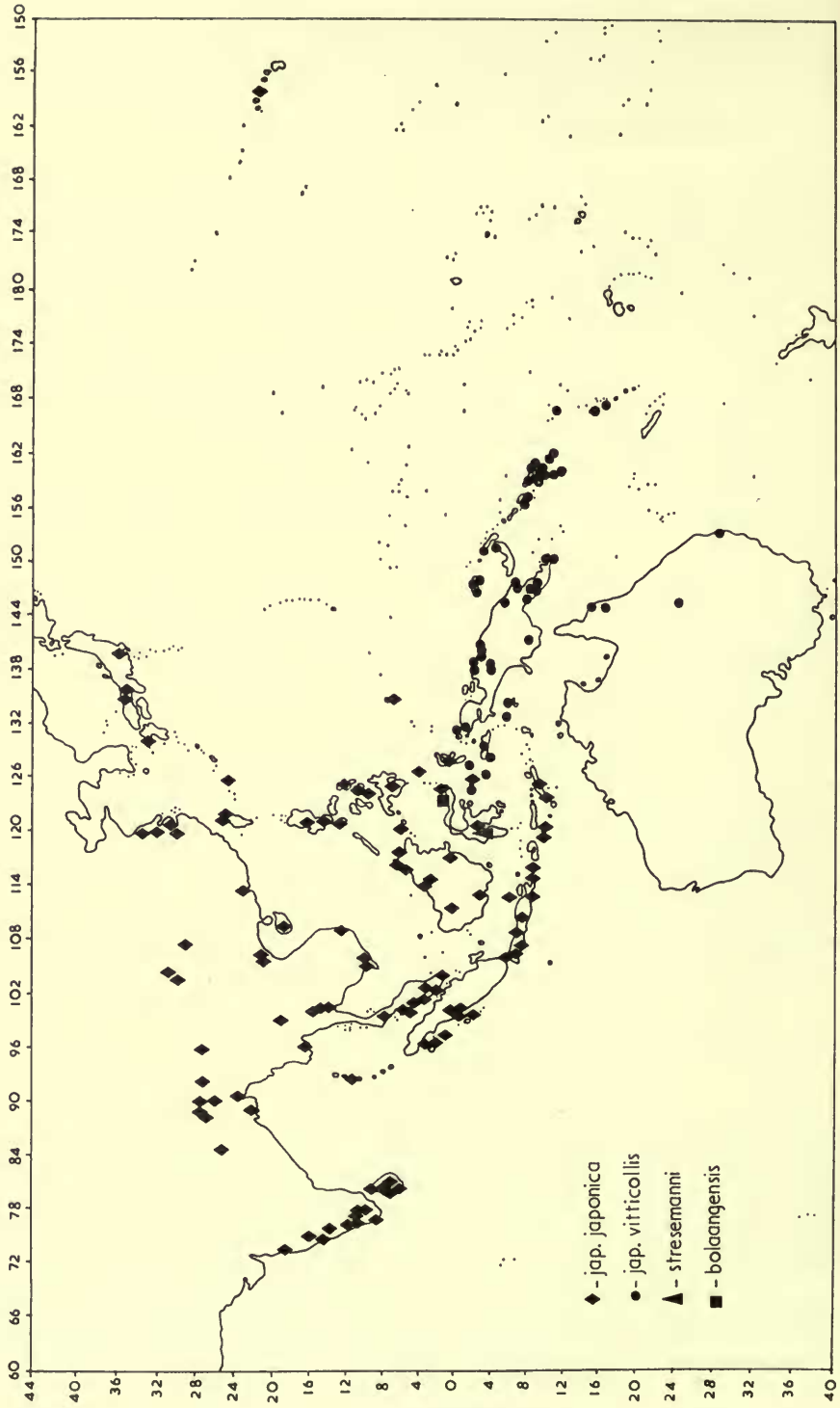


FIG. 138. *Oxya* spp., distribution map.

Blanchard (*in* Gay, 1851) described *Acridium vittigerum* from an unspecified number of individuals from Coquimbo, Santa Rosa, Chile; and later (Blanchard, 1853) described another species, this time from a single female, from Triton Bay, New Guinea, under the same name, viz. *Acridium vittigerum*. Both descriptions are not particularly diagnostic but in each case measurements are given and these differ from one another quite appreciably.

A. vittigerum Blanchard, 1851 has since been placed in the genus *Dicroplus* (Phillipi, 1863; Berg, 1881; Liebermann, 1942, 1958) but Kirby (1910) quoted this species under *Schistocera* (Kirby, 1910: 461) and *Osmilia* (Kirby, 1910: 540, as *O. vittiger*).

A. vittigerum Blanchard, 1853 has been placed in the genus *Oxya* (Kirby, 1910, Willemse, 1955).

Dirsh (1965: 40), during his preliminary study of the genus *Schistocerca*, asked to borrow from MNHN, Paris the type of *Acridium vittigerum* Blanchard, 1851, as this species was listed by Kirby (1910: 461) under the genus *Schistocera*. He received from MNHN, Paris the type-female of *Acridium vittigerum* Blanchard, 1853 and not, as he thought, that of *A. vittigerum* Blanchard, 1851. Further he found, quite correctly, this specimen to be conspecific with the type of *Oxya gavisa* (Walker, 1870), but he published Walker's name in synonymy with *Acridium vittigerum* Blanchard, 1851 (nec 1853), hence causing some confusion in the literature.

I have now explained the relevant material from MNHN, Paris and offer the following interpretation of the situation.

There are, in MNHN, Paris, at least two female specimens bearing relevant data to both Blanchard's 1851 and 1853 descriptions. One bears the following data: 'Museum Paris. Chili. Gay, 15–43'; a green disc with the handwritten figures on the back '15' (or 19) '43' (or 48); and a red label with the handwritten data '*Acridium vittigerum* Blanch. Paratypus – CSC. 1966'. The locality 'Chili' and collector 'Gay' is consistent with Blanchard's 1851 publication. Two of its measurements are – body length, 22·3 mm, fore wings extended, 40· 3mm, or on the French line scale 11 lines and 18 lines respectively. These measurements fall well within the range given in the 1851 description, i.e., 'Long., 10–12 lin.; enverg. alar., 18–19 lin.' I therefore take this specimen to be a syntype of *Acridium vittigerum* Blanchard, 1851, and further agree with other authors (Phillipi, 1863; Berg, 1881; Liebermann, 1942, 1958) that it should be placed in the genus *Dichroplus*.

Another specimen bears the following data: a red type label; a buff label with the legend 'Museum Paris. Nouv.-Guinée, Baie Triton. Jaquinot 1841'; a pinkish disc with the handwritten figures on the back '733. 41'; a label with Blanchard's handwriting '*Acridium vittigerum* Bl.'; and a label in Dirsh's handwriting '*Oxya vittigerum* Blanch. V. M. Dirsh det. 1964'. This information is consistent with Blanchard's 1853 publication, as he states (pages 1 and 2) the entomological material was collected by Jacquinot and Hombron, and after the description (p. 372) he gives the type-locality as Triton Bay, New Guinea. Two of its measurements are: body length, 32·4 mm, fore wings extended, 51·1 mm, which agree with figures quoted in the 1853 description, 'Long. corp. 32 millim., extens. alar., 52 millim.' Therefore

I take this specimen to be the female holotype of *Acridium vittigerum* Blanchard, 1853. It is conspecific with the holotype of *Oxya gavisa* (Walker, 1870) but is invalid due to its primary homonymy with *Acridium vittigerum* Blanchard, 1851.

At the time of describing *A. vittigerum* Blanchard, 1853 (nec 1851), Blanchard also described *Acridium vitticolle* from a single male from the same locality. This specimen is conspecific with the holotypes of both *A. vittigerum* Blanchard, 1853 and *Heteracris gavisa* Walker, 1870, and becomes the valid name for this taxon.

The male holotype of *Oxya gavisa aurantiaca* Willemse is labelled 'N. N. Guinea Exp. 1926, W. Docters v. Leeuwen, Mamberamo, Datum vi.' It represents a colour variety very common in New Guinea populations of *j. vitticollis*.

Oxya gavisa var. *brachyptera* Willemse was erected in title as a variety but regarded in Willemse's discussion as a subspecies. The female holotype is labelled 'Neth. Ind. Amer. New Guinea Exp. Baliem Camp 1938, 1,600 M., 16–22.xi. L.J. Toxopeus leg.' This form has not been recorded since its original description and is known only from a male and two female specimens, all from the type-locality. Willemse distinguished it from '*gavisa*' by the smaller size, shortened tegmina, and truncate rather than bilobed apex of the male cercus. In fact the male cercus is very similar to that of *j. japonica*, a feature which is rare but not unique in New Guinea populations of *j. vitticollis*. The smaller size and abbreviated tegmina of these specimens is possibly due to some temperature effect as they were collected at a height of 1,600 metres.

Distribution (Text-fig. 138). Countries and months of capture, from 426 specimens examined.

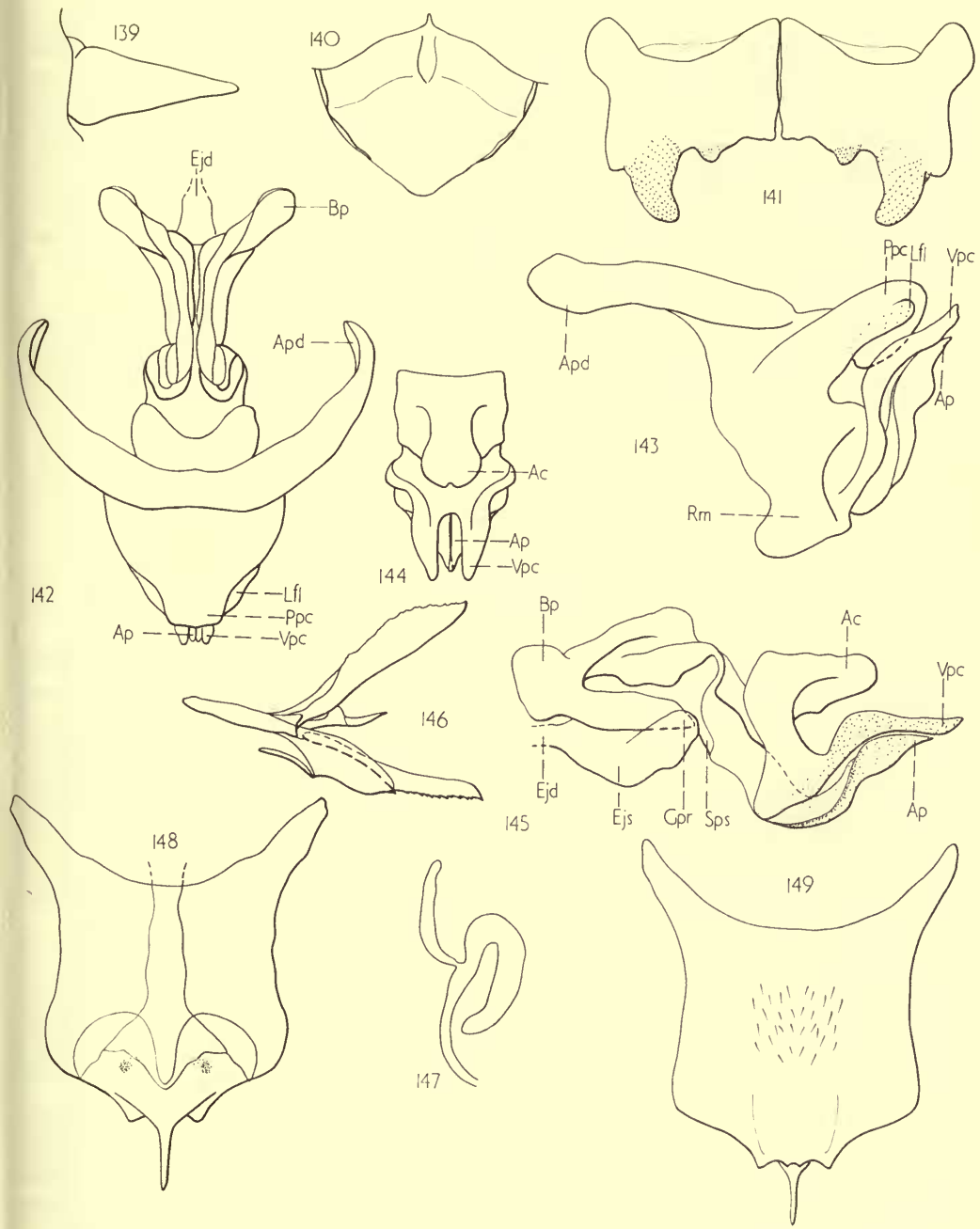
Sula Is: May; Obi Is: March to May, July, August, October; Buru: August; Amboina: September, October; Ceram: April, November; Key Is: September; Aru Is: September, October; New Guinea: all year round; Bismarck Archipelago: March, April, June, December; Solomon Is: including Bougainville; all year round; New Hebrides: April, August, December; Australia: February to April, June, July.

Oxya stresemanni Ramme, 1941

(Text-figs 138–149)

Oxya stresemanni Ramme, 1941: 213. Holotype ♂, Sulawesi, 'Celebes, Latimodjong – Geb. Oeroe, 800 m., 8.1930, Heinrich G.' (MNHU, Berlin) [examined].
Oxya stresemanni Ramme; Willemse, 1955: 156.

Diagnosis. ♂. Integument finely pitted and shiny. Antenna as long as combined lengths of head and pronotum, with 25–26 segments. Interocular distance slightly narrower than frontal ridge at median ocellus. Dorsum of pronotum slightly flattened and hardly narrowing forwards, posterior margin of metazona broadly obtuse-angular. Tegmen fully developed. Supra-anal plate (Text-fig. 140) rounded triangular, without basal folds; cercus (Text-fig. 139) conical with subacute apex. Epiphallus (Text-fig. 141) with narrow bridge, without ancorae, with hook-like outer lophi and very small tooth-like inner lophi; rest of phallic complex as in Text-figs 142–145; posterior process of cingulum trapezoid from above, lateral fleshy lobes large and visible from above; valvular plate of cingulum with very deep posterior emargination; apical valves of penis long, slender, upcurved and twisted.



FIGS 139–149. *Oxya stresemanni* Ramme, terminalia and genitalia; male, 139, cercus, lateral view; 140, supra-anal plate, dorsal view; 141, epiphallus; 142, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 143, cingulum, lateral view; 144, apex of penis, dorsal view; 145, endophallus, lateral view; female, 146, ovipositor, lateral view; 147, spermatheca; 148, subgenital plate, dorsal view; 149, same, ventral view.

♀. Larger and more robust than ♂. Antenna slightly shorter than combined lengths of head and pronotum. Interocular distance as wide as frontal ridge at median ocellus. Anterior margin of tegmen weakly spined. Spermatheca as in Text-fig. 147. Valves of ovipositor (Text-fig. 146) with tooth-like spines; posterior ventral basivalvular sclerite with a strong spine on its inner ventral margin. Ventral surface of subgenital plate (Text-fig. 149) with a weak posterior flattening and two weak lateral longitudinal ridges; medial pair of spines on posterior margin closely spaced and smaller than lateral pair.

Measurements (mm) – Length of body, ♂ 25·3, ♀ 27·9; pronotum, ♂ 4·8, ♀ 6·0; tegmen, ♂ 17·4, hind femur, ♂ 13·7, ♀ 16·9; maximum width of hind femur, ♂ 2·8, ♀ 3·4; ratio of length of tegmen to pronotum (E/P), ♂ 3·62; ratio of length of tegmen to hind femur (E/F), ♂ 1·27; ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·89, ♀ 4·97.

Discussion. By the form of the phallic complex it seems that this species is close to *O. japonica* (Thunberg), from which it may be distinguished in the male by the sinuous apical penis valves and the absence of basal folds on the supra-anal plate, and in the female by the structure of the subgenital plate.

Distribution (Text-fig. 138). Known only from the type-series.

Oxya bolaangensis sp. n.

(Text-figs 25, 138, 150–159)

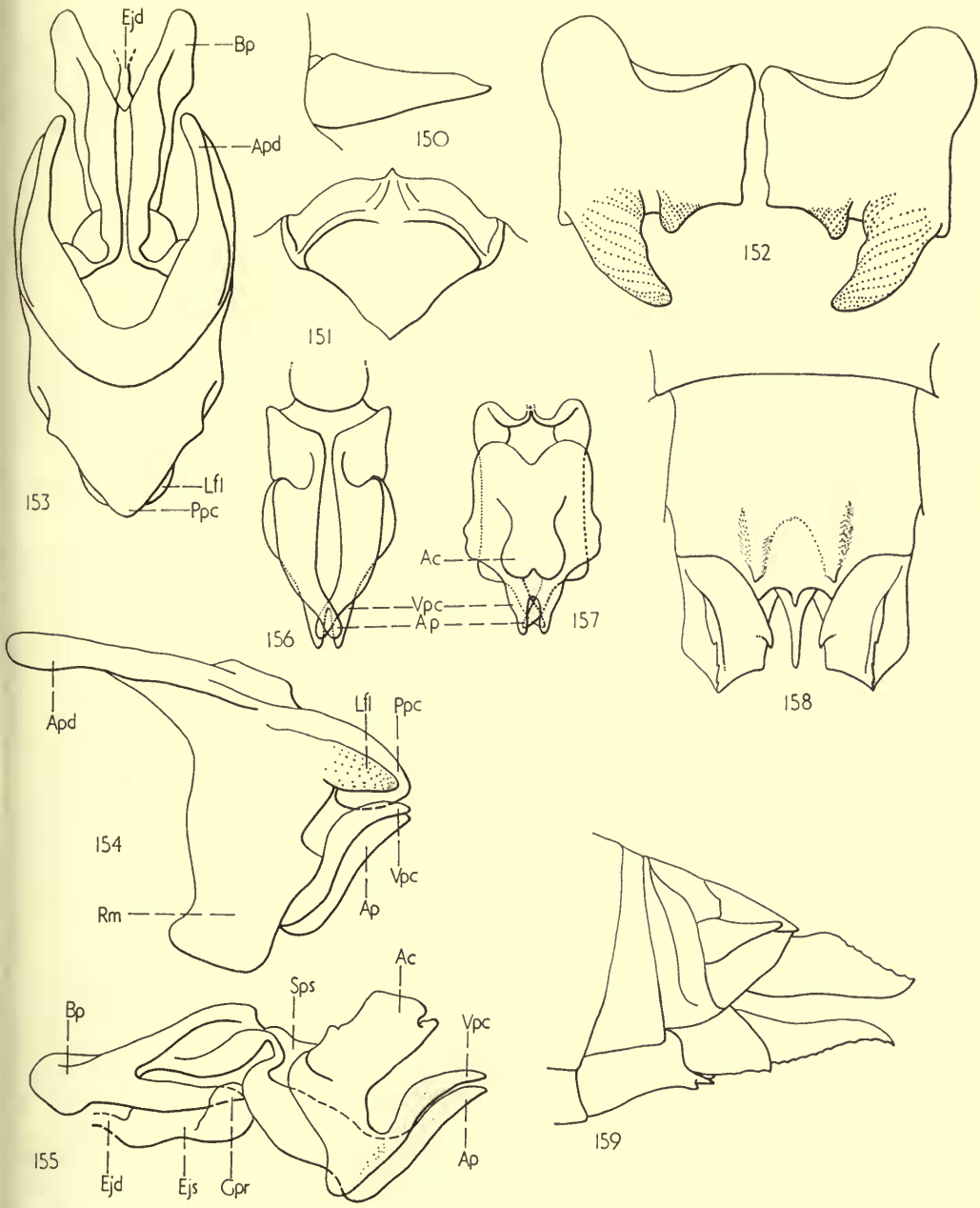
Description. ♂. Integument finely pitted and shiny. Antenna incomplete but from size of medial segments of flagellum obviously longer than combined lengths of head and pronotum. Interocular distance slightly narrower than frontal ridge at median ocellus. Dorsum of pronotum flattened and narrowing forwards, posterior margin of metazona widely obtuse-angular. Tegmen fully developed and extending beyond apex of hind femur. Supra-anal plate (Text-fig. 151) rounded triangular with well developed basal folds; cercus (Text-fig. 150) conical, with weakly truncate apex. Epiphallus (Text-fig. 152) with narrow bridge, without ancorae, with hook-like outer lophi and small tooth-like inner lophi; rest of phallic complex as in Text-figs 153–157; posterior process of cingulum rounded triangular from above, lateral fleshy lobes large and visible from above; valvular plate of cingulum with a deep posterior emargination; apical valves of penis long, slender, upcurved.

♀. Larger and more robust than ♂. Antenna slightly shorter than combined lengths of head and pronotum, with 28 segments. Interocular distance slightly wider than frontal ridge at median ocellus. Anterior margin of tegmen very weakly spined. Valves of ovipositor (Text-fig. 159) with tooth-like spines; posterior ventral basivalvular sclerite with a large spine on its inner ventral margin; ventral surface of subgenital plate (Text-fig. 158) with a small median posterior concavity bordered on each side by a weak lateral longitudinal ridge; posterior margin with a single medial spine and a pair of lateral spines.

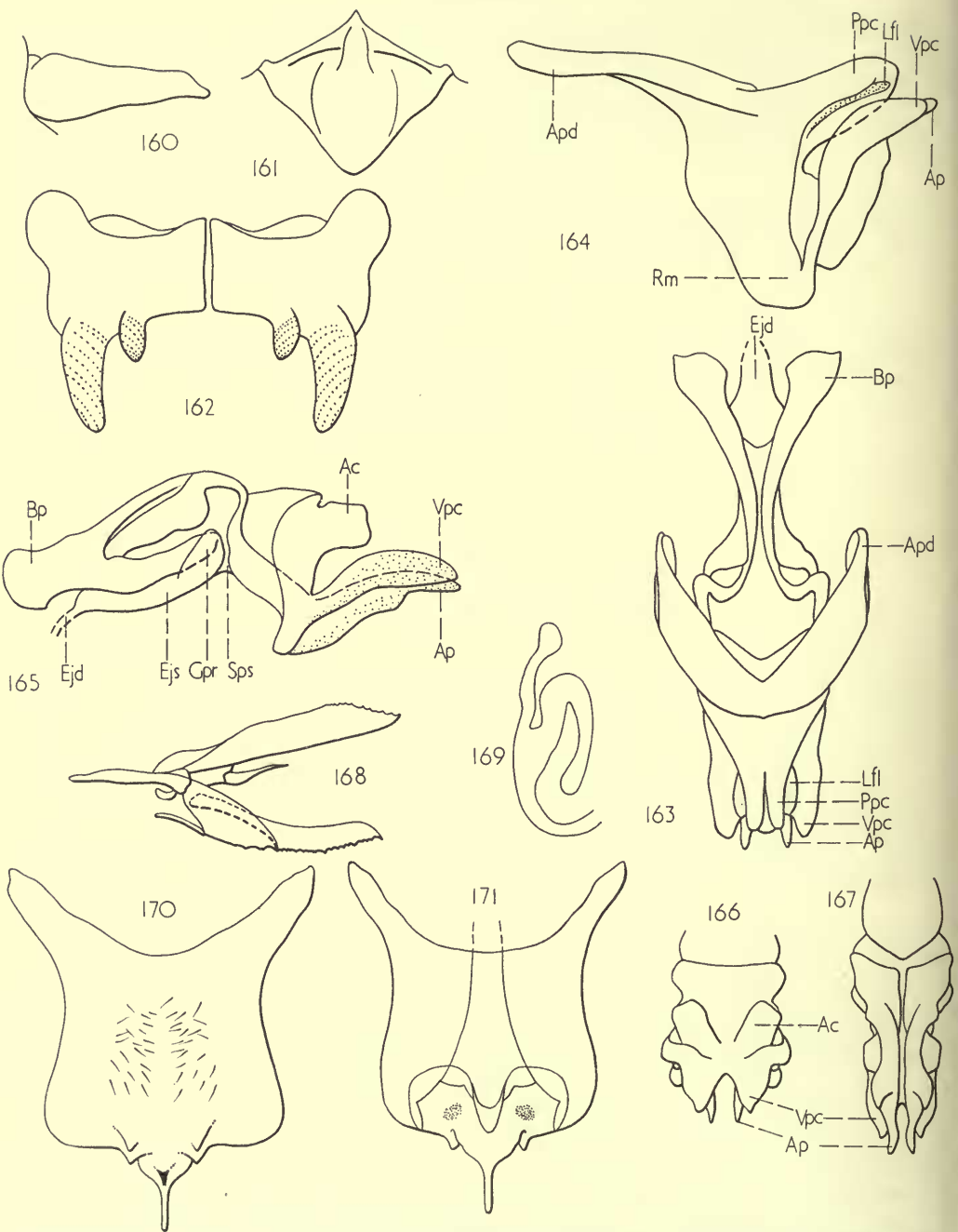
Measurements (mm) – Length of body, ♂ 25·1, ♀ 28·7; pronotum, ♂ 5·1, ♀ 6·2; tegmen, ♂ 19·1, ♀ 22·3; hind femur, ♂ 14·4, ♀ 17·1; maximum width of hind femur, ♂ 2·8, ♀ 3·6; ratio of length of tegmen to pronotum (E/P), ♂ 3·74, ♀ 3·60; ratio of length of tegmen to hind femur (E/F), ♂ 1·33, ♀ 1·30; ratio of length of hind femur to its maximum width (FL/FW), ♂ 5·14, ♀ 4·75.

Holotype ♂, Sulawesi: 'Bolaang, N. Celebes, Aug. 1917, W. Kaudern', deposited in coll. Willemse.

Paratype. 1 ♀, same data and depository as holotype.



FIGS 150–159. *Oxya bolaangensis* sp. n., terminalia and genitalia; male, 150, cercus, lateral view (from dry specimen); 151, supra-anal plate, dorsal view (from dry specimen); 152, epiphallus; 153, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 154, cingulum, lateral view; 155, endophallus, lateral view; 156, apex of penis, ventral view; 157, same, dorsal view; female, 158, subgenital plate and posterior ventral basivalvular sclerite, ventral view (from dry specimen); 159, apex of abdomen, lateral view (from dry specimen.)



FIGS 160–171. *Oxya nitidula* (Walker), terminalia and genitalia; male, 160, cercus, lateral view; 161, supra-anal plate, dorsal view; 162, epiphallus; 163, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 164, cingulum, lateral view; 165, endophallus, lateral view; 166, apex of penis, dorsal view; 167, same, ventral view; female, 168, ovipositor, lateral view; 169, spermatheca; 170, subgenital plate, ventral view; 171, same, dorsal view.

Discussion. The form of the male supra-anal plate and phallic complex suggests that this species is closely related to *O. japonica* (Thunberg), from which it may be distinguished, in the male, by the absence of any dorsal division on the posterior process of the cingulum, and by the unique structure of the female subgenital plate.

Oxya nitidula (Walker, 1870)

(Text-figs 160–172)

Acridium nitidulum Walker, 1870: 631. Holotype ♀, 'S. India' (BMNH) [examined].
Oxya nitidula (Walker) Walker, 1871: 64.
[*Oxya intricata* (Stål); Brunner von Wattenwyl, 1893: 153, partim. Misidentification.]
[*Oxya velox* (Fabricius); Kirkby, 1910: 393, partim. Misidentification.]
Oxya tridentata Willemse, 1925: 30, fig. 27. Holotype ♀, Ceylon, 'Nord Ceylon, Jun. 1889, H. Fruhstorfer' (NM, Vienna) [examined]. [Synonymized by Uvarov, 1926: 47.]
Oxya tridentata Willemse; Tandon and Shishodia, 1969: 266.

Diagnosis. ♂. Integument finely pitted and shiny. Antenna about as long as combined lengths of head and pronotum, with 24–26 segments. Interocular distance as wide as frontal ridge at median ocellus. Pronotum almost cylindrical, narrowing forwards, posterior margin of metazona rounded. Tegmen fully developed, clearly surpassing apex of hind femur. Supra-anal plate (Text-fig. 161) rounded triangular, with well developed basal folds; cercus (Text-fig. 160) conical, with strongly truncate apex. Epiphallus (Text-fig. 162) with narrow bridge, without ancorae, with relatively straight outer lophi and small, slender inner lophi; rest of phallic complex as in Text-figs 163–167; posterior process of cingulum narrowly rounded triangular in dorsal view, with strong median division posteriorly; lateral fleshy lobes visible from above; valvular plate of cingulum deeply and broadly emarginate posteriorly; apical valves of penis long, slender, upcurved.

♀. Larger and more robust than ♂. Antenna slightly shorter than combined lengths of head and pronotum. Interocular distance slightly wider than frontal ridge at median ocellus. Anterior margin of tegmen weakly spined. Spermatheca as in Text-fig. 169); valves of ovipositor (Text-fig. 168) with tooth-like spines; posterior ventral basivalvular sclerite with a spine on its inner ventral margin; ventral surface of subgenital plate (Text-fig. 170) with a pair of well developed submargino-lateral spines, posterior margin with a single medial spine and a pair of lateral spines.

Measurements (mm) – Length of body, ♂ 18·3–23·3, ♀ 22·6–29·1; pronotum, ♂ 3·6–4·9, ♀ 4·9–5·9; tegmen, ♂ 12·2–19·8, ♀ 15·7–24·2; hind femur, ♂ 9·7–11·9, ♀ 12·7–15·6; maximum width of hind femur, ♂ 2·2–2·6, ♀ 2·7–3·2; mean ratio of length of tegmen to pronotum (E/P), ♂ 3·89, ♀ 3·78; mean ratio of length of tegmen to hind femur (E/F), ♂ 1·49, ♀ 1·47; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·62, ♀ 4·75.

Discussion. *O. nitidula* is very close to *O. japonica* (Thunberg) but may be distinguished from the latter by the truncate apex of the male cercus (*O. japonica* from S. India and Ceylon has a cercus with an almost pointed apex) and the form of the subgenital plate.

Synonymy. *O. tridentata* Willemse was described from a female holotype and other material from Ceylon, Mahe and India. Uvarov (1926) made the above synonymy, mentioning that the species identified by Willemse (1925) as *O. nitidula* unique (Walker) was another species altogether.

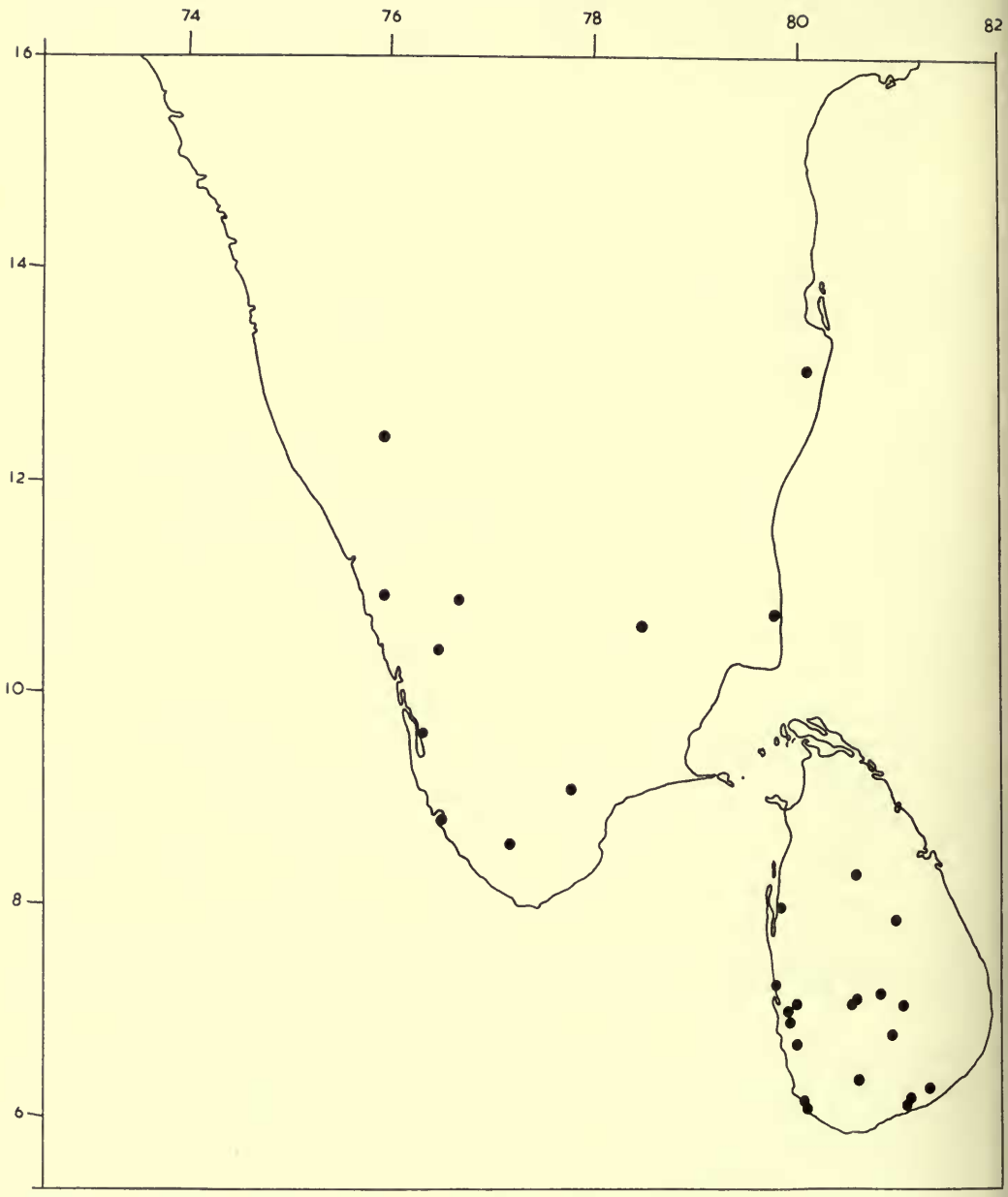


FIG. 172. *Oxya nitidula* (Walker), distribution map.

Brunner von Wattenwyl (1893), in his discussion of *O. intricata* (Stål), mentions that he had material from Ceylon. Willemse's type of *O. tridentata* bears a Brunner von Wattenwyl identification '*Oxya intricata*' and it therefore seems that the latter's record of *O. intricata* from Ceylon should be referred to *O. nitidula*.

Distribution (Text-fig. 172). Countries and months of capture, from 245 specimens examined.

India (South): July through to May; Ceylon: January to May, July, September.

Oxya agavisa Tsai, 1931

This species is divided into two subspecies.

Oxya agavisa agavisa Tsai, 1931

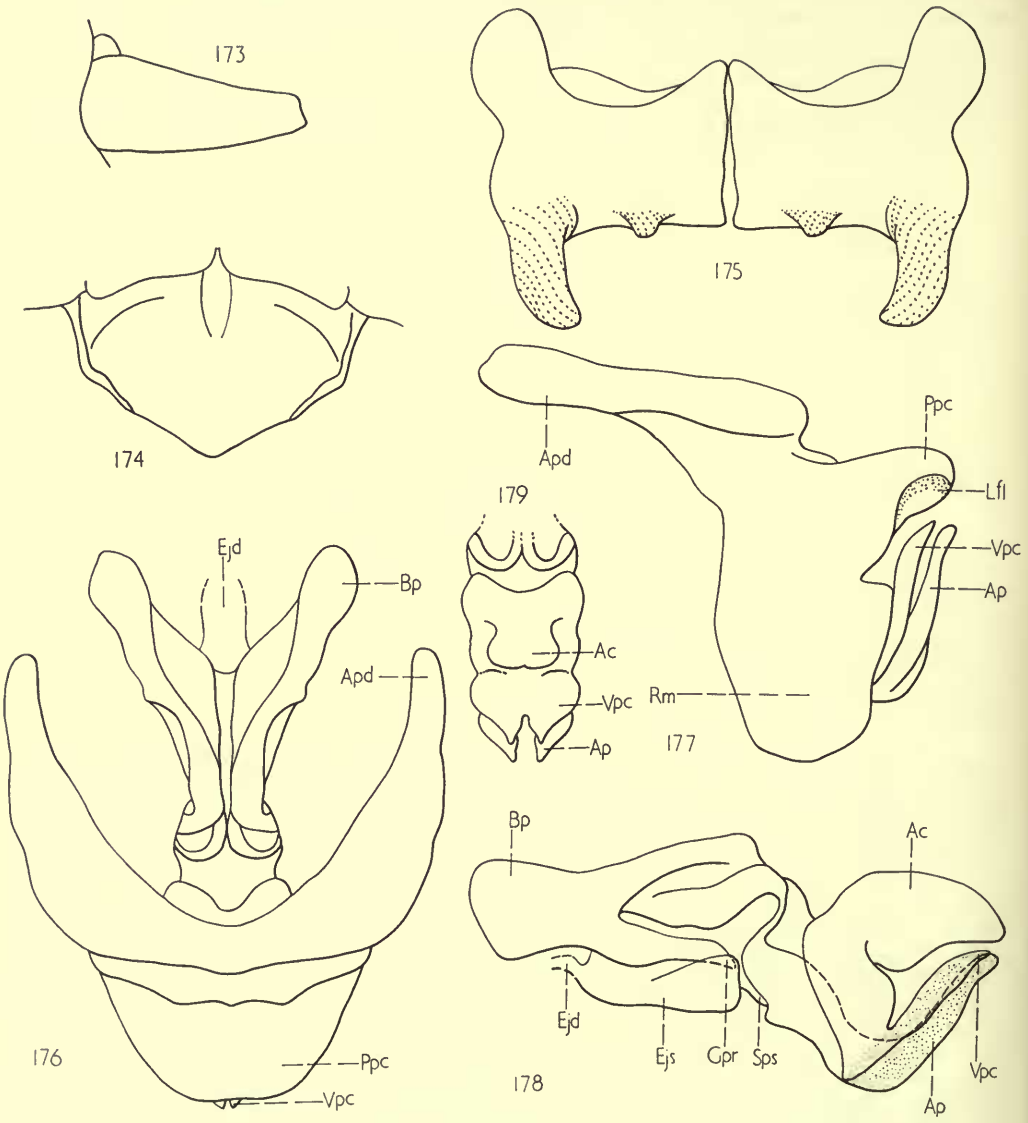
(Text-figs 173–183, 203)

Oxya agavisa Tsai, 1931: 437, fig. 1. Holotype ♀, China 'Kwanhien (Szetschwan Prov.)' (MNHU, Berlin) [examined].
Oxya agavisa f. *robusta* Tsai, 1931: 439.
Oxya agavisa f. *robusta* Tsai; Tinkham, 1940: 296.
Oxya agavisa Tsai; Tinkham, 1940: 296.
Oxya agavisa Tsai; Mishchenko, 1951: 165, fig. 276.
Oxya agavisa Tsai; Mishchenko, 1952: 151, figs 211, 215.

Diagnosis. ♂. Integument finely pitted and shiny. Antenna longer than combined lengths of head and pronotum, with 26–27 segments. Interocular distance wider than frontal ridge at median ocellus. Dorsum of pronotum flattened, hardly narrowing forwards, posterior margin of metazona obtuse-angular. Tegmen fully developed, not or hardly surpassing apex of hind femur. Supra-anal plate (Text-fig. 174) rounded triangular, with weak basilateral folds; cercus (Text-fig. 173) conical, with broad truncate apex. Epiphallus (Text-fig. 175) with narrow bridge, without ancorae, with slender, hook-like outer lophi and small, tooth-like inner lophi; rest of phallic complex as in Text-figs 176–179; posterior process of cingulum, from above, large and rounded trapezoid; lateral fleshy lobes not visible from above; valvular plate of cingulum with a broad, deep posterior emargination; apical valves of penis long, slender, upcurved.

♀. Larger and more robust than ♂. Antenna slightly shorter than combined lengths of head and pronotum. Anterior margin of tegmen weakly spined. Spermatheca as in Text-fig. 183; valves of ovipositor (Text-fig. 182) with tooth-like spines, posterior ventral basivalvular sclerite with a large spine on its inner ventral margin; ventral surface of subgenital plate (Text-fig. 180) with deep median posterior concavity bordered on either side by a strong lateral longitudinal ridge which bears spines along its length; posterior margin of subgenital plate, excluding spines, with a triangular profile, median pair of spines well developed and closely spaced, two pairs of lateral spines present.

Measurements (mm) – Length of body, ♂ 24·4–33·7, ♀ 27·9–33·3; pronotum, ♂ 4·8–6·9, ♀ 6·6–7·6; tegmen, ♂ 14·5–21·1, ♀ 16·7–21·3; hind femur, ♂ 13·9–18·6, ♀ 18·2–21·7; maximum



FIGS 173–179. *Oxya agavisa agavisa* Tsai, male terminalia and genitalia; 173, cercus, lateral view, 174; supra-anal plate, dorsal view; 175, epiphallus; 176, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 177, cingulum, lateral view; 178, endophallus, lateral view; 179, apex of penis, dorsal view.

width of hind femur, ♂ 2·9–3·8, ♀ 3·7–4·5; mean ratio of length of tegmen to pronotum (E/P), ♂ 3·05, ♀ 2·75; mean ratio of length of tegmen to hind femur (E/F), ♂ 1·13, ♀ 1·01; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·83, ♀ 4·77.

DISTRIBUTION (Text-fig. 203. Country and months of capture, from 54 specimens examined.

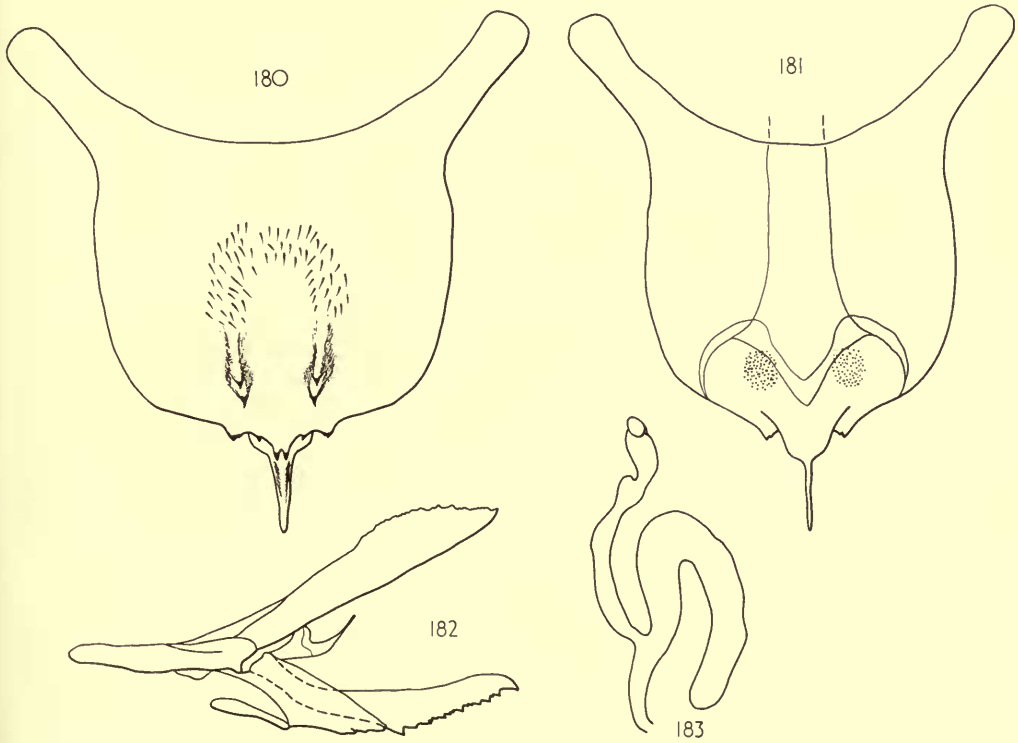
CHINA: July, August.

Oxya agavisa tinkhami Uvarov, 1935 **stat. n.**

(Text-figs 184–187, 203)

Oxya tinkhami Uvarov, 1935: 268, fig. 2. Holotype ♀, CHINA, 'Kwantung, S. China, Loh Fau Shan, alt. 3,800–4,000', Aug. 25. 1933, E. R. Tinkham' (BMNH) [examined].
Oxya tinkhami Uvarov; Tinkham, 1940: 293, 379.

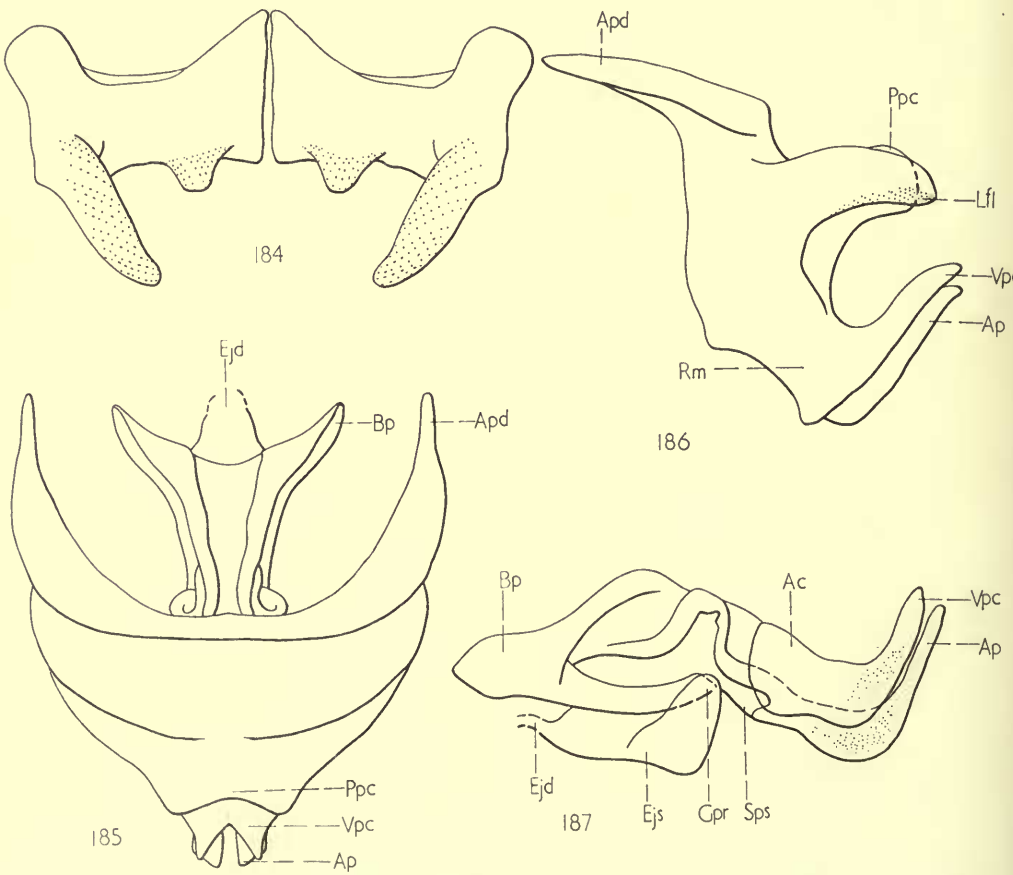
DIAGNOSIS. Differs from nominate subspecies in that antenna, in ♂, is only as long as combined lengths of head and pronotum, and in both sexes the tegmina are strongly reduced to the brachypterous condition.



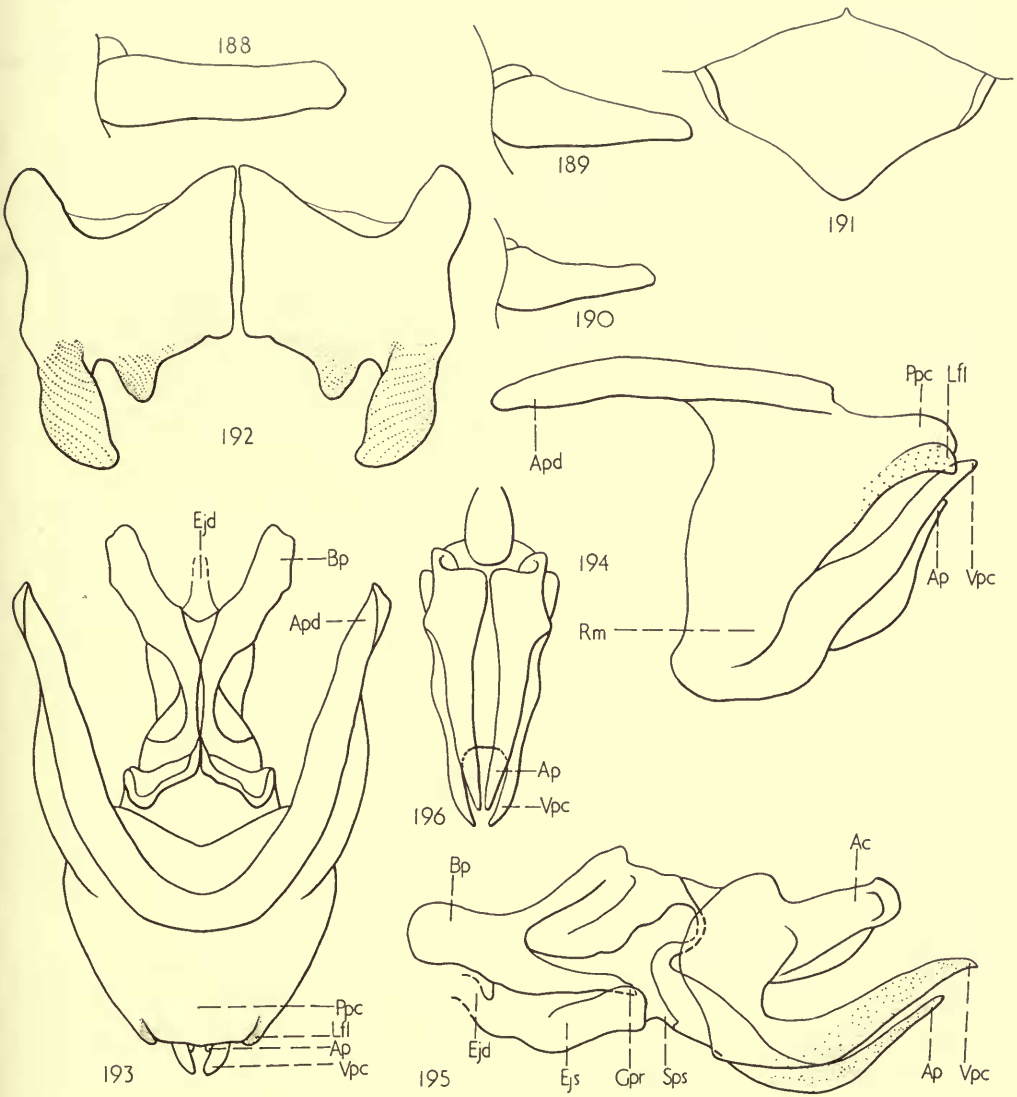
FIGS 180–183. *Oxya agavisa agavisa* Tsai, female terminalia and genitalia; 180, subgenital plate, ventral view; 181, same, dorsal view; 182, ovipositor, lateral view; 183, spermatheca.

Measurements (mm) – Length of body, ♂ 23·7, ♀ 31·7–32·0; pronotum, ♂ 4·9, ♀ 7·2–7·3; tegmen, ♂ 6·5, ♀ 9·8–10·0; hind femur, ♂ 13·8, ♀ 19·7; maximum width of hind femur, ♂ 3·0, ♀ 4·1; ratio of length of tegmen to pronotum (E/P), ♂ 1·33, ♀ 1·36–1·37; ratio of length of tegmen to hind femur (E/F), ♂ 0·47, ♀ 0·50; ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·60, ♀ 4·80.

Discussion. Considering *O. agavisa* as a polytypic species its distribution is restricted to the montane areas of southern China. Very little material is known but Tinkham (1940) records it from 'the mountains bordering the north of Kwangtung and Fukien to Chekiang and Hupeh and west to Szechwan.' Within this range the form *tinkhami* is restricted to the upper slopes of Loh Fau Shan in Kwangtung while the form *agavisa* is not found in this locality (for known distribution of the two



Figs 184–187. *Oxya agavisa tinkhami* Uvarov, male genitalia; 184, epiphallus; 185, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 186, cingulum, lateral view; 187, endophallus, lateral view.



FIGS 188–196. *Oxya chinensis* (Thunberg), male terminalia and genitalia; 188, cercus, lateral view, of specimen from Chinese mainland; 189, same, from Maritime province, USSR; 190, same, from Manchuria; 191, supra-anal plate, dorsal view; 192, epiphallus; 193, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 194, cingulum, lateral view; 195, endophallus, lateral view; 196, apex of penis, ventral view.

subspecies see Text-fig. 203). Morphologically the two forms are only distinguishable on the features mentioned above, there being no significant differences in the structure of the male phallic complex and the female subgenital plate.

In the light of these zoogeographical and morphological points it seems logical to regard the form *tinkhami* as an allopatric population of *O. agavisa* with sufficient identity to warrant subspecific status.

Oxya chinensis (Thunberg, 1815)

(Text-figs 188–203)

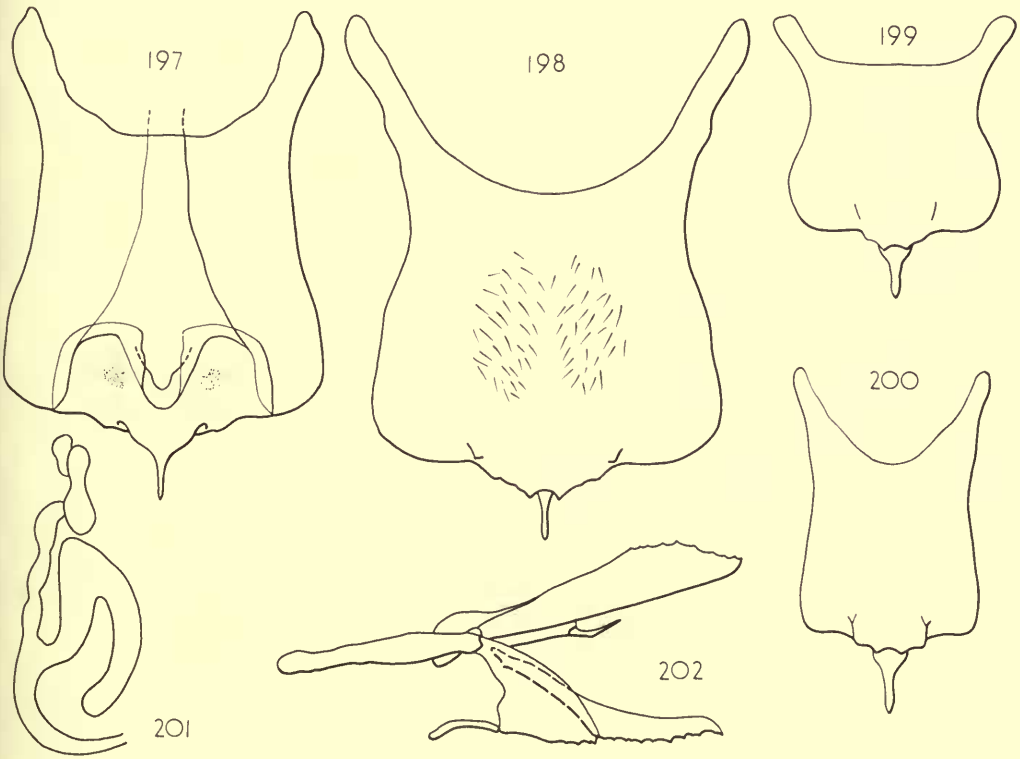
Gryllus chinensis Thunberg, 1815: 253. Holotype ♀, China, '*chinensis*, China' (ZIUU, Uppsala) [examined].
Gryllus lutescens Thunberg, 1815: 254. LECTOTYPE ♂, China (ZIUU, Uppsala), here designated [examined]. [Synonymized by Willemse, 1955: 156.]
Oxya chinensis (Thunberg) var. *b;* Stål, 1873: 82.
Oxya vicina Brunner von Wattenwyl, 1893: 152. LECTOTYPE ♀, China: Amoy (NM, Vienna), here designated [examined]. **Syn. n.**
[*Oxya velox* (Fabricius); Kirby, 1910: 393, partim. Misidentification.]
Oxya vicina Brunner von Wattenwyl; Kirby, 1914: 199.
Oxya vicina Brunner von Wattenwyl; I. Bolívar, 1918: 16.
Oxya adentata Willemse, 1925, 26; figs 20–22. Holotype ♂, China, 'China, Shense prov., Taipaishan, 10.10.05' (BMNH) [examined]. **Syn. n.**
[*Oxya velox* (Fabricius); Willemse, 1925: 52, figs 58, 59. Misidentification.]
Oxya shanghaiensis Willemse, 1925: 54, figs 60, 61. Holotype ♀, China: Shanghai, (NM, Vienna) [examined]. **Syn. n.**
Oxya manzhurica Bei-Bienko, 1929: 105, figs 2, 3. Holotype ♂, China, 'Manchuria: Station Mangau, 12. viii. 1926' (ZI, Leningrad) [examined]. **Syn. n.**
Oxya rammei Tsai, 1931, 439: fig. 2. Holotype ♂, China, China, Canton, 1912, Mell, S.V.' (MNHU, Berlin) [examined]. **Syn. n.**
Oxya chinensis (Thunberg); Liu and Li, 1933: 59, 11 figs.
[*Oxya velox* (Fabricius); Chang, 1934: 186. Misidentification.]
Oxya formosana Shiraki, 1937: 21. Syntypes, Taiwan (lost). **Syn. n.**
Oxya manzhurica nakaii Furukawa, 1939: 84, figs 46, 47, 49–59, 62 (in Japanese); 161, figs 65, pl. 12, figs 3, 12, pl. 18, figs 2, 6, 13, pl. 19, figs 1, 5, 9, 13, 15, 17, 22 (in English). Holotype ♂, China: Jehol (lost),. **Syn. n.**
[*Oxya velox* (Fabricius); Takana and Yanagihara, 1939: 76. Misidentification.]
[*Oxya velox* (Fabricius); Tinkham, 1940: 296. Misidentification.]
Oxya chinensis (Thunberg); Mishchenko, 1951: 167, figs 289, 296, 299, partim.
Oxya sinuosa Mishchenko, 1951 : 167, figs 281, 290, 300. Holotype (sex not given), Korea (South): Seoul (ZI, Leningrad). **Syn. n.**
Oxya maritima Mischenko, 1951: 169, figs 313–315. Holotype (sex not given), USSR, Yakovlevka (ZI, Leningrad). **Syn. n.**
Oxya chinensis (Thunberg) Mishchenko, 1952: 155, partim.
[*Oxya velox* (Fabricius); Willemse, 1955: 153. Misidentification.]
Oxya sianensis Cheng Tse-ming, 1964: 885, figs 1–7. Holotype ♀, China: Sian (Chinese Academy of Sciences, N. Region, Entomological Research Institute). **Syn. n.**
[*Oxya velox* (Fabricius); Yasumatsu and Watanabe, 1965: 1. Misidentification.]
Oxya formosana Shiraki; Fukuhara, 1966: 202.

Diagnosis. ♂. Integument finely pitted and shiny. Antenna as long as or slightly longer than combined lengths of head and pronotum. Interocular distance as wide as or slightly narrower than frontal ridge at median ocellus. Dorsum of pronotum flattened, almost parallel-

sided. Tegmen fully developed. Supra-anal plate (Text-fig. 191) rounded triangular, without basilateral folds; cercus (Text-figs 188–190) conical, apex rounded or subacute. Epiphallus (Text-fig. 192) with narrow bridge, without ancorae, with hook-like outer lophi and moderately sized, tooth-like inner lophi; rest of phallic complex as in Text-figs 193–196; posterior process of cingulum rounded trapezoid in dorsal view; lateral fleshy lobes visible from above; valvular plate of cingulum broadly and deeply emarginate posteriorly; apical valves of penis long, slender, upcurved.

♀. Larger and more robust than ♂. Antenna shorter than combined lengths of head and pronotum. Interocular distance wider than frontal ridge at median ocellus. Anterior margin of tegmen weakly spined. Spermatheca as in Text-fig. 201; valves of ovipositor (Text-fig. 202) with tooth-like spines; posterior ventral basivalvular sclerite with a spine on its inner ventral margin; ventral surface of subgenital plate (Text-figs 198–200) convex, with or without traces of premarginilateral spines, posterior margin almost transverse, medial pair of spines small, closely spaced or absent.

Measurements (mm) – Length of body, ♂ 15·1–33·1, ♀ 19·6–40·5; pronotum, ♂ 3·3–6·6, ♀ 4·1–8·7; tegmen, ♂ 10·4–25·5, ♀ 11·4–32·6; hind femur, ♂ 9·7–18·2, ♀ 11·7–23·0; maximum width of hind femur, ♂ 1·9–3·8, ♀ 2·3–4·4; mean ratio of length of tegmen to pronotum (E/P), ♂ 3·46, ♀ 3·54; mean ratio of length of tegmen to hind femur (E/F), ♂ 1·31, ♀ 1·33; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·99. ♀ 5·00,



Figs 197–202. *Oxya chinensis* (Thunberg), female terminalia and genitalia; 197, subgenital plate, dorsal view; 198, same, ventral view, of specimen from Chinese mainland; 199, same, from Manchuria; 200, same, from Maritime province, USSR; 201, spermatheca; 202, ovipositor, lateral view.

Discussion. From a study of the types and other material of the species synonymized above, it is clear that it represents the ecological and geographical variations of *O. chinensis* (Thunberg). Around the coastal regions of the Chinese mainland individuals are generally larger, have longer tegmina and the male cercus is quite blunt apically (Text-fig. 188). Further inland in the montane regions specimens tend to be smaller, have relatively shorter tegmina and the male cerci appear truncate apically (Text-fig. 189). Island populations, e.g., from Hainan and Taiwan also have these tendencies. Populations from Manchuria and the Maritime province of USSR are even smaller and, the further north the population the shorter the tegmina become, while the male cerci are quite acute apically (Text-fig. 190). However in all these populations the male phallic complex has a remarkably stable morphology and there seems no valid reason for the retention of these specific names.

Material from the Ryuku Is and Japan which has been previously identified as *O. formosa* Shiraki varies very little from populations on the Chinese mainland. *O. chinensis* may be identified by the form of the female ovipositor and subgenital plate and the male supra-anal plate and phallic complex. The female subgenital plate of *O. yezoensis* Shiraki is very similar but in the latter species the tegmina are relatively shorter. Japanese specimens of *O. chinensis* always have much longer tegmina.

Biological and economic references to this species may be found in Liu and Li (1933), Takana and Yanagihara (1939), Tinkham (1940) and Yasumatsu and Watanabe (1965).

Synonymy. The type-material of *Gryllus lutescens* Thunberg consists of three male specimens labelled α, β and γ. Specimens α and γ represent *O. japonica* (Thunberg) and specimen β is *O. chinensis* (Thunberg). In order not to disturb established synonymy (Willemse, 1925) specimen β, a male, is selected as LECTOTYPE for *G. lutescens* Thunberg.

Oxya vicina Brunner von Wattenwyl was described from several specimens of both sexes from Amoy, Shanghai, Hainan, Japan and 'Himalayas'. Willemse (1925) did not designate a lectotype from this material but assigned the specimens to various species. The Shanghai specimen was described as a new species, *O. shanghaiensis*. Of the Japanese specimens some were described as a new species, *O. japonica* Willemse (nec Thunberg), and others named as his *O. velox* (Fabricius) as were the specimens from Amoy, Hainan and 'Himalayas'. It is clear that Willemse's interpretation of *O. velox* (Fabricius) is the species identified here as *O. chinensis* (Thunberg). Again in order not to upset published synonymy the Amoy specimen is selected as lectotype for *O. vicina*.

The female holotype of *O. shanghaiensis* and the male holotype of *O. rammei* do not differ significantly from lowland Chinese populations of *O. chinensis* and are synonymized. Also, in my opinion, *O. adentata* Willemse, *O. manzhurica* Bei-Bienko, *O. manzhurica nakaii* Furukawa, *O. sinuosa* and *O. maritima* Mishchenko merely represent local and extreme variations of *O. chinesis* and are synonymized.

Correspondence with colleagues in Japan and Taiwan has established that the type-material of *O. formosana* Shiraki is lost. However the original description

clearly separates this species from *O. japonica* (Thunberg) on the lack of lateral longitudinal ridges on the ventral surface of the female subgenital plate; so the above synonymy is made.

I have been unable to examine the type-series of *O. sianensis* Cheng Tse-ming but from the original description and figures there can be little doubt that the above synonymy is correct. The type-details are: Holotype ♀, Sian, Shensi, 450 m, 4.x.1962.

DISTRIBUTION (Text-fig. 203). Countries and months of capture, from 132 specimens examined.

USSR (Maritime Prov.): June, August, September; CHINA: July to December; TAIWAN: August; KOREA: October; JAPAN (including Ryuku Is); July to September; VIETNAM: no dates: 'HIMALAYAS'; no dates.

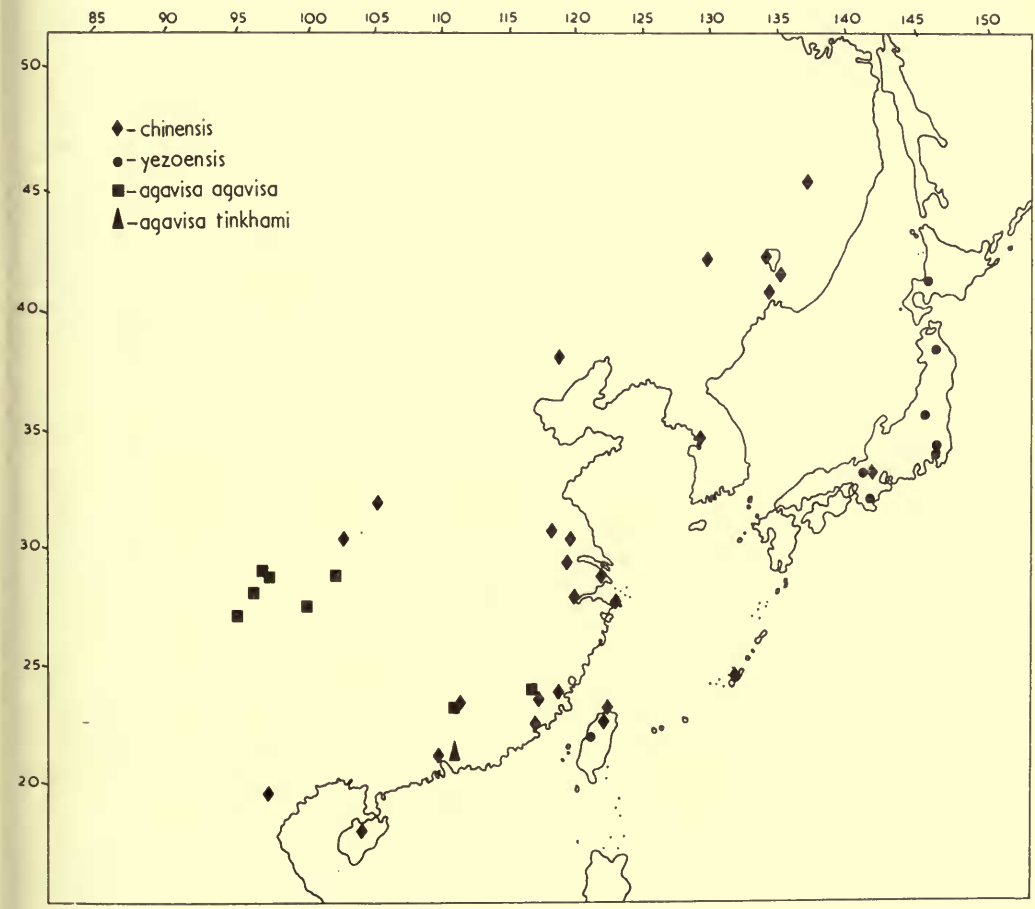
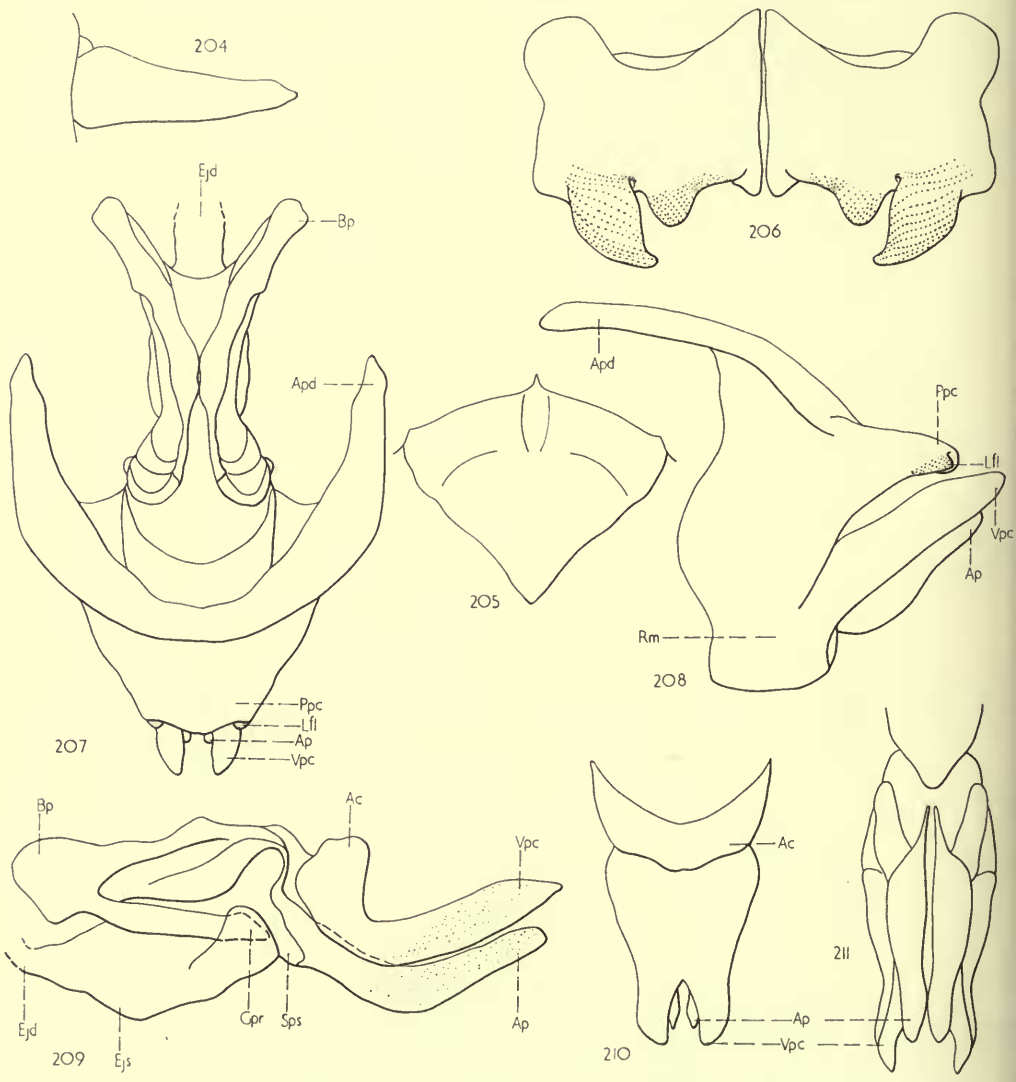


FIG. 203. *Oxya* spp., distribution map.

Oxya yezoensis Shiraki, 1910
(Text-figs 203–215)

Oxya yezoensis Shiraki, 1910: 43. Syntypes, JAPAN: Sapporo (lost). NEOTYPE ♂, 'Japan, Hokkaido, Nopporo Forest, 22.ix.1969 (Takagi, S.)' (ZIHU, Sapporo), here designated [examined].

[*Oxya vicina* Brunner von Wattenwyl, 1893: 152, partim. Mixed type-series.]



FIGS 204–211. *Oxya yezoensis* Shiraki, male terminalia and genitalia; 204, cercus, lateral view; 205, supra-anal plate, dorsal view; 206, epiphallus; 207, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 208, cingulum, lateral view; 209, endophallus, lateral view; 210, apex of penis, dorsal view; 211, same, ventral view.

Oxya podisma Karny, 1915: 86, LECTOTYPE ♂, Taiwan, 'Hoozan, Formosa, H. Sauter, 1910' (DEI, Eberswalde), here designated [examined]. **Syn. n.**
Oxya yezoensis Shiraki; I. Bolívar, 1918: 43.
Oxya podisma Karny; Willemse, 1925; 17, figs 6–8.
Oxya yezoensis Shiraki; Willemse, 1925: 19, fig. 9.
Oxya japonica Willemse (nec Thunberg), 1925: 31, fig. 28. Holotype ♀, Japan, 'Japan, Mus. Caes. Vindobon. *Oxya vicina* Br. v. W.' (NM, Vienna) [examined]. [Synonymized by Fukuhara, 1966: 202.]
Oxya japonica Willemse; Mishchenko, 1951: 171, fig. 322, partim.
Oxya yezoensis Shiraki; Mishchenko, 1951: 171, fig. 323.
Oxya japonica Willemse; Mishchenko, 1952: 167, fig. 257, partim.
Oxya yezoensis Shiraki; Mishchenko, 1952: 168, fig. 258.
Oxya japonica Willemse; Murai, 1954: 1.
Oxya japonica Willemse; Iwata and Nagatomi, 1954: 23.
Oxya japonica Willemse; Murai, 1957: 22.
Oxya japonica Willemse; Suga, 1963: 867.
Oxya yezoensis Shiraki: Yasumatsu and Watanabe, 1965: 1.
Oxya japonica Willemse; Yasumatsu and Watanabe, 1965: 1.
Oxya yezoensis Shiraki; Grist and Lever, 1969: 286.

Diagnosis. ♂. Integument finely pitted and shiny. Antenna shorter or longer than combined lengths of head and pronotum. Interocular distance wider than frontal ridge at median ocellus. Dorsum of pronotum flattened, hardly narrowing forwards, posterior margin of metazona broadly obtuse-angular. Tegmen fully developed or shortened, never surpassing apex of hind femur and sometimes reduced almost to brachypterous condition. Supra-anal plate (Text-fig. 205) rounded triangular, without or with very weak basilateral folds; cercus (Text-fig. 204) conical, with subacute or weakly truncate apex. Epiphallus (Text-fig. 206) with narrow bridge, without ancorae, with hook-like outer lophi and large tooth-like inner lophi; rest of phallic complex as in Text-figs 207–211; posterior process of cingulum trapezoid from above; lateral fleshy lobes just visible from above; valvular plate of cingulum broadly and quite deeply incised posteriorly; apical valves of penis long and relatively stout.

♀. Larger and more robust than ♂. Antenna shorter than combined lengths of head and pronotum. Anterior margin of tegmen very weakly spined. Spermatheca as in Text-fig. 213; valves of ovipositor (Text-fig. 212) with tooth-like spines; posterior ventral basivalvular sclerite with a spine on its inner ventral margin; ventral surface of subgenital plate (Text-fig. 214) convex, posterior margin almost transverse and either with a pair of small, closely spaced spines medially, or unarmed.

Measurements (mm) – Length of body, ♂ 16·4–33·2, ♀ 18·9–38·5; pronotum, ♂ 3·5–6·9, ♀ 4·0–8·5; tegmen, ♂ 7·0–21·3, ♀ 7·7–26·8; hind femur, ♂ 9·4–17·8, ♀ 11·3–22·6; maximum width of hind femur, ♂ 2·1–3·7, ♀ 2·4–4·3; mean ratio of length of tegmen to pronotum (E/P), ♂ 2·35, ♀ 2·31; mean ratio of length of tegmen to hind femur (E/F), ♂ 0·85, ♀ 0·88 mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·62, ♀ 4·78.

Discussion. This species is probably allied to *O. chinensis* (Thunberg), being distinguished from other Japanese species of the genus by the rather flat dorsum of the pronotum, the male phallic complex, and the shorter tegmina which do not extend beyond the apex of the hind femur.

Synonymy. Apart from having shorter tegmina, Karny's type-series of *O. podisma* shows no significant morphological difference from populations of *O. yezoensis* found in Hokkaido, Japan, and the above synonymy is made.

Willemse (1925) erected a new species *O. japonica* (nec Thunberg) from some of the Japanese specimens of Brunner von Wattenwyl's type-series of *O. vicina*. It is

clear, however, that this material merely represents the more southern Japanese populations of *O. yezoensis* and Fukuhara's (1966) synonymy is accepted.

Biological and economic references on this species may be found in Murai (1954, 1957), Iwata and Nagatomi (1954), Suga (1963), Yasumatsu and Watanabe (1965) and Grist and Lever (1969).

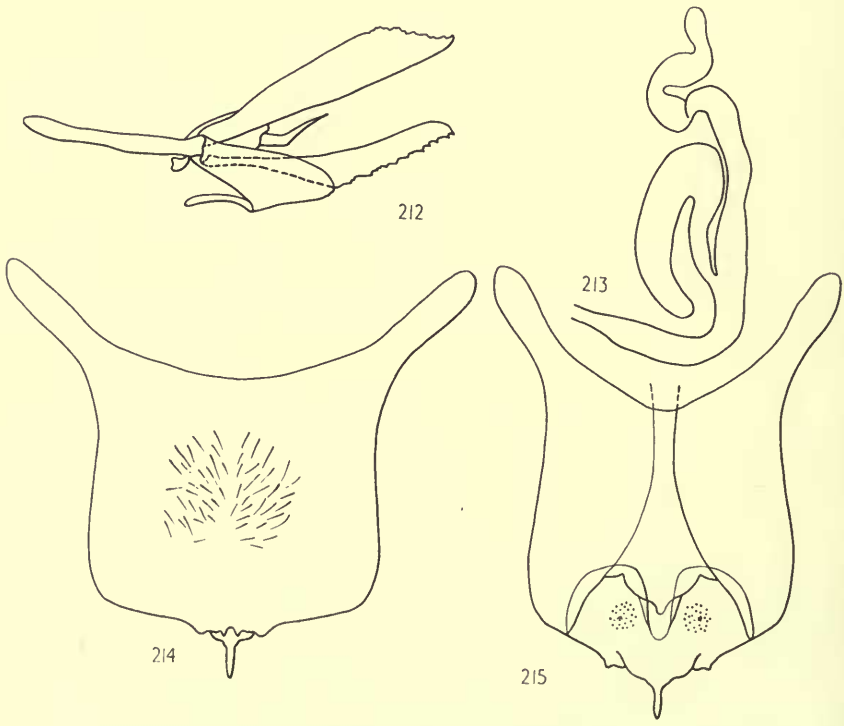
DISTRIBUTION (Text-fig. 203). Countries and months of capture, from 77 specimens examined.

TAIWAN: no dates; JAPAN: August to November.

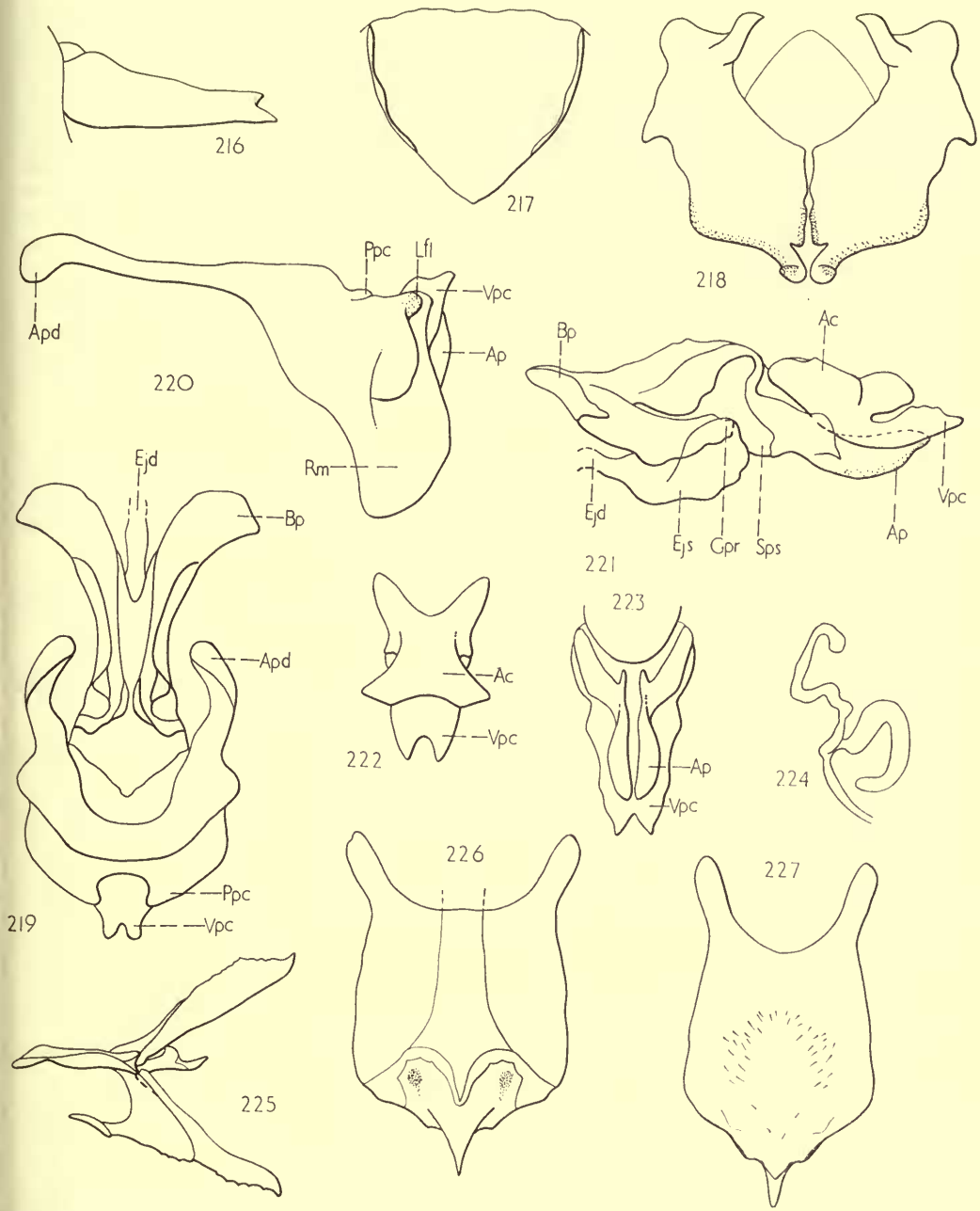
Oxya bidentata Willemse, 1925

(Text-figs 216–227, 245)

Oxya bidentata Willemse, 1925: 24, figs 16, 17. Holotype ♂, PAKISTAN (WEST), 'N.W. India, Peshawar Dist., Taru. 17–21.x.14, Fletcher coll.' (BMNH) [examined].
[*Oxya nitidula* (Walker); Willemse, 1925: 29, fig. 26. Misidentification.]
[*Oxya nitidula* (Walker); Chahal and Sardah Singh, 1966: 23. Misidentification.]
[*Oxya nitidula* (Walker); Chahal and Sardah Singh, 1967: 88. Misidentification.]
[*Oxya nitidula* (Walker); Cejchan, 1970: 246. Misidentification.]



FIGS 212–215. *Oxya yezoensis* Shiraki, female terminalia and genitalia; 212, ovipositor, lateral view; 213, spermatheca, 214, subgenital plate, ventral view, 215, same, dorsal view.



FIGS 216–227. *Oxya bidentata* Willemse, terminalia and genitalia; male, 216, cercus, lateral view; 217, supra-anal plate, dorsal view; 218, epiphallus; 219, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 220, cingulum, lateral view; 221, endophallus, lateral view; 222, apex of penis, dorsal view; 223, same, ventral view; female, 224, spermatheca; 225, ovipositor, lateral view; 226, subgenital plate, dorsal view; 227, same, ventral view.

Diagnosis. ♂. Integument finely pitted and shiny. Antenna as long as combined lengths of head and pronotum, with 22–24 segments. Interocular distance narrower than frontal ridge at median ocellus. Dorsum of pronotum flattened, hardly narrowing forwards, posterior margin of metazona rounded. Tegmen fully developed, well surpassing apex of hind femur. Supra-anal (Text-fig. 217) rounded triangular, without basilateral folds; cercus (Text-fig. 216) conical with bifurcate apex, both upper and lower lobes with subacute apices. Epiphallus (Text-fig. 218) with very broad, plate-like bridge, with ancorae, with narrow and strongly hook-like outer lophi and ridge-like inner lophi, epiphallic membrane thickened anteriorly between halves of bridge; rest of phallic complex as in Text-figs 219–223; posterior process of cingulum with broad posterior emargination; lateral fleshy lobes not visible from above; valvular plate of cingulum with broad posterior emargination; apical valves of penis short, stubby.

♀. Larger and more robust than ♂. Antenna slightly shorter than combined lengths of head and pronotum. Interocular distance slightly wider than frontal ridge at median ocellus. Anterior margin of tegmen without spines. Spermatheca as in Text-fig. 224; valves of ovipositor with tooth-like spines; posterior ventral basivascular sclerite without spines on its inner ventral margin; ventral surface of subgenital plate (Text-fig. 227) convex or flat, posterior margin triangular.

Measurements (mm) – Length of body, ♂ 18·1–21·9, ♀ 24·3–33·6; pronotum, ♂ 3·5–4·5, ♀ 4·5–6·2; tegmen, ♂ 15·2–20·3, ♀ 19·4–27·2; hind femur. ♂ 9·8–13·6, ♀ 12·5–17·5; maximum width of hind femur, ♂ 2·1–2·8, ♀ 2·8–3·5; mean ratio of length of tegmen to pronotum (E/P), ♂ 4·50, ♀ 4·25; mean ratio of length of tegmen to hind femur (E/F), ♂ 1·64, ♀ 1·56; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·64, ♀ 4·70.

Discussion. *O. bidentata* and the following two species form a distinct group, having in common a plate-like epiphallus which has ancorae and is totally different from that of other species in the genus.

Biological references to this species may be found in Chahal and Sardah Singh (1966 and 1967) under *O. nitidula* (Walker).

Synonymy. Uvarov (1926) correctly associated Willemse's 1925 identification and description of *O. nitidula* (Walker) with this species.

Distribution (Text-fig. 245). Countries and months of capture, from 38 specimens examined.

Afghanistan: July, August, October; W. Pakistan: June to August, October; Iran: March, July.

Oxya sinobidentata sp. n.

(Text-figs 228–233, 245)

[*Oxya bidentata* Willemse; Chang, 1934: 186. Misidentification.]
[*Oxya bidentata* Willemse; Tsai, 1931: 436. Misidentification.]
[*Oxya bidentata* Willemse; Tinkham, 1940: 293. Misidentification.]

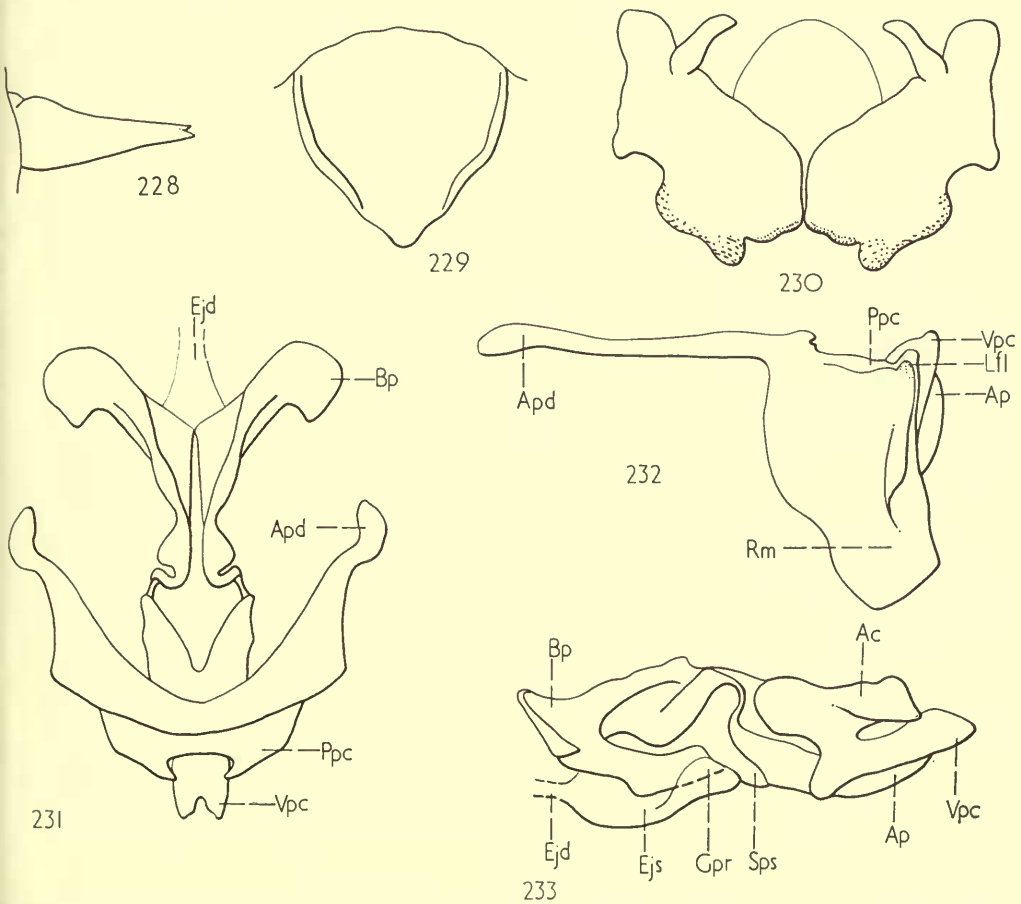
Diagnosis. Very similar to *O. bidentata* Willemse, differing in that the tegmen is relatively shorter, the apical third of the hind femur is reddish brown and, in the male epiphallus, the inner lophi are more widely spaced and the outer lophi are rounded and not at all hook-like (Text-fig. 230).

Measurements (mm) – Length of body, ♂ 17·7–19·9, ♀ 25·2–27·3; pronotum, ♂ 3·4–3·7, ♀ 4·4–5·0; tegmen, ♂ 13·7–15·2, ♀ 17·7–19·7; hind femur, ♂ 9·5–10·5, ♀ 12·0–13·9; maximum

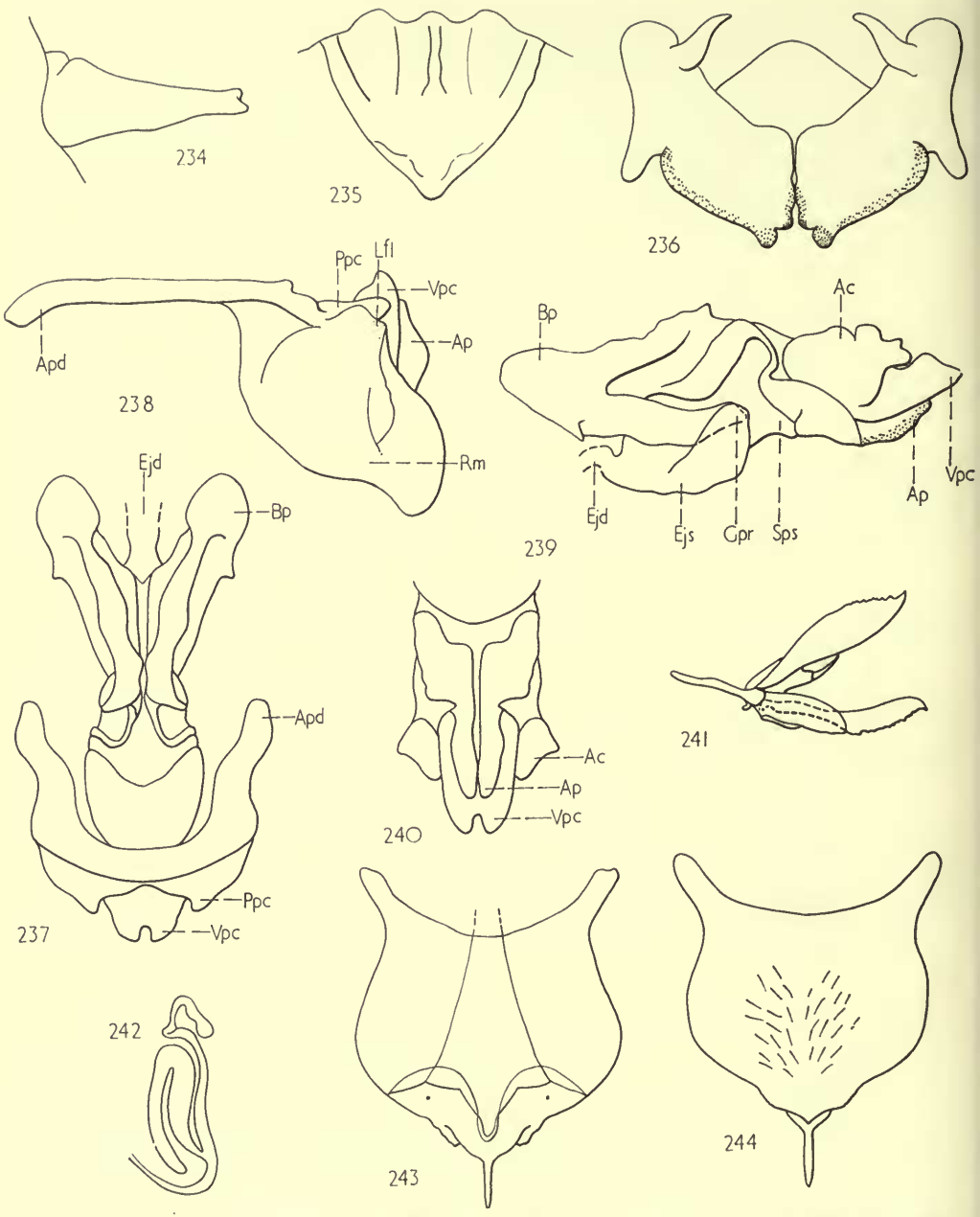
width of hind femur, ♂ 2·0–2·2, ♀ 2·4–2·9; mean ratio of length of tegmen to pronotum (E/P), ♂ 4·10, ♀ 3·98; mean ratio of length of tegmen to hind femur (E/F), ♂ 1·46, ♀ 1·42; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·69, ♀ 4·84.

Holotype ♂, CHINA, 'China: Nanking, vii/ix. 1936, T. L. Tsou,' deposited in BMNH.

Paratypes. CHINA: 1 ♀, same data as holotype (BMNH); 1 ♂, 1 ♀, Kiangsiu, ix (*Kolthoff*) (NM, Maastricht); 6 ♂, 4 ♀, Chekiang, Hangcheou, 1925 (*A. Pichon*) (1 ♂, 1 ♀ in NM, Maastricht, remainder in MNHN, Paris).



FIGS 228–233. *Oxya sinobidentata* sp. n., male terminalia and genitalia; 228, cercus, lateral view; 229, supra-anal plate, dorsal view; 230, epiphallus; 231, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 232, cingulum, lateral view; 233, endophallus, lateral view.



FIGS 234–244. *Oxya javana* Willemse, terminalia and genitalia; male 234, cercus, lateral view; 235, supra-anal plate, dorsal view; 236, epiphallus; 237, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 238, cingulum, lateral view; 239, endophallus, lateral view; 240, apex of penis, ventral view; female, 241, ovipositor, lateral view; 242, spermatheca; 243, subgenital plate, dorsal view; 244, same, ventral view.

Discussion. The differences found in the male epiphallus of this species from *O. bidentata* are constant and the two population groups appear to be reproductively isolated. In ANS, Philadelphia there are four females labelled 'Toungoo, Burma, A. V. B. Crumb'; these specimens have the hind femur reddened apically and their mean E/P and E/F ratios are 3·90 and 14·3 respectively; both characters suggesting *O. sinobidentata* sp. n. However, in the absence of males from this population I hesitate to include them as paratypes of *O. sinobidentata* and prefer to leave them doubtfully determined. Also in ANS, Philadelphia is a single female labelled 'Kwanhsien, China, Sze-chaun, 2800', viii.9.1930.'; this specimen agrees very well with the type-series of *O. sinobidentata* but the tegmina are reduced to a brachypterous condition (E/P = 1·93 and E/F = 0·69). Again in the absence of males this specimen is only doubtfully identified as *O. sinobidentata* and is not included in the type-series.

Biological references to this species may be found in Tinkham (1950) under *O. bidentata* Willemse.

Oxya javana Willemse, 1955

(Text-figs 234–245)

Oxya javana Willemse, 1955: 148, fig. 87, pl. 1, fig. 1. Holotype ♀, Java, 'Centr. Java, 700m., Aug. 1934, Dieng Mts., Telega Pengilon' (RNH, Leiden) [examined].

Diagnosis. Differs from *O. bidentata* in that it is smaller, antenna shorter than combined lengths of head and pronotum, and the tegmen is relatively shorter. Also differs from *O. sinobidentata* sp. n. in that hind femur is unicolourous. The male epiphallus is closer in shape to *bidentata* than *sinobidentata*.

Measurements (mm) – Length of body, ♂ 17·5–20·8, ♀ 23·4–24·9; pronotum, ♂ 3·5–3·9, ♀ 4·8–5·4; tegmen, ♂ 12·9–15·5, ♀ 16·6–18·4; hind femur, ♂ 10·2–10·9, ♀ 13·2–13·9; maximum width of hind femur, ♂ 2·3–2·5, ♀ 2·8–3·0; mean ratio of length of tegmen to pronotum (E/P), ♂ 3·78, ♀ 3·48; mean ratio of length of tegmen to hind femur, ♂ 1·33, ♀ 1·29; mean ratio of length of hind femur to its maximum width, ♂ 4·45, ♀ 4·56.

Discussion. *O. javana* Willemse is known only from the type-locality and has not been recorded since the original description. The form of the male epiphallus, cerci and supra-anal plate (Text-figs 234–236) and the female subgenital plate (Text-fig. 244) place the species in the *bidentata* group where it may be distinguished by the relatively shorter tegmina and unicolorous hind femora.

The evidence would suggest that *javana, sinobidentata* and *bidentata* populations are closely related and have undergone divergent evolution through geographical isolation.

Distribution (Text-fig. 245). Known only from the type-series.

Oxya paravicina Willemse, 1925

(Text-figs 245–257)

Oxya paravicina Willemse, 1925: 55, figs 62, 63. Holotype ♂, India, 'Col. Br. v. W., Hinterindien, Thorey' (NM, Vienna) [examined].

DIAGNOSIS. ♂. Integument finely pitted and shiny. Antenna longer than combined lengths of head and pronotum, with 24 segments. Interocular distance narrower than frontal ridge at median ocellus. Dorsum of pronotum almost cylindrical, with parallel sides; posterior margin of metazona rounded. Tegmen strongly reduced, extending to posterior margin of third abdominal tergite, along the dorsal mid line of the tegmina hardly touch; hind wing strap-like, slightly shorter than tegmen. Posterior margin of 10th abdominal tergite (Text-fig. 247) with a rhomboidal projection on either side of the mid line; supra-anal plate (Text-fig. 247) trapezoid with rounded triangular posterior projection; cercus (Text-fig. 246) conical with dorso-ventral flattening apically. Epiphallus (Text-fig. 248) with narrow bridge, with ancorae, with large rounded outer lophi and two pairs of small tooth-like inner lophi, the very inner pair more sharply pointed; rest of phallic complex as in Text-fig. 249–253; posterior process of cingulum with a median emargination posteriorly; lateral fleshy lobes visible from above; valvular plate of cingulum with small median emargination posteriorly; apical valves of penis short, slender.

♀. Larger and more robust than ♂. Antenna with 26 segments, as long as combined lengths of head and pronotum. Interocular distance as wide as or slightly wider than frontal ridge at median ocellus. Tegmina very reduced, extending just past posterior margin of third abdominal tergite. Spermatheca as in Text-fig. 254; pre-apical diverticulum much more convoluted than usual for genus and with several small subdiverticula; valves of ovipositor (Text-fig. 255) with tooth-like spines, posterior ventral basivalvular sclerite without spines on inner ventral margin; ventral surface of subgenital plate (Text-fig. 256) convex or flat, with two very widely spaced spines on posterior margin.

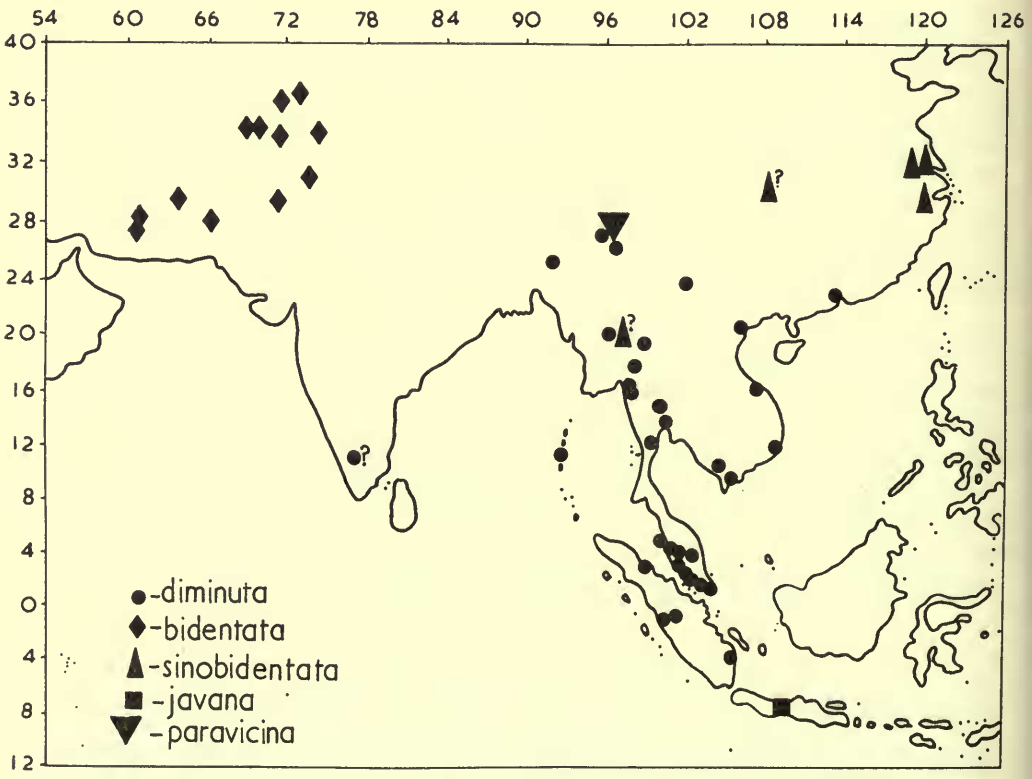
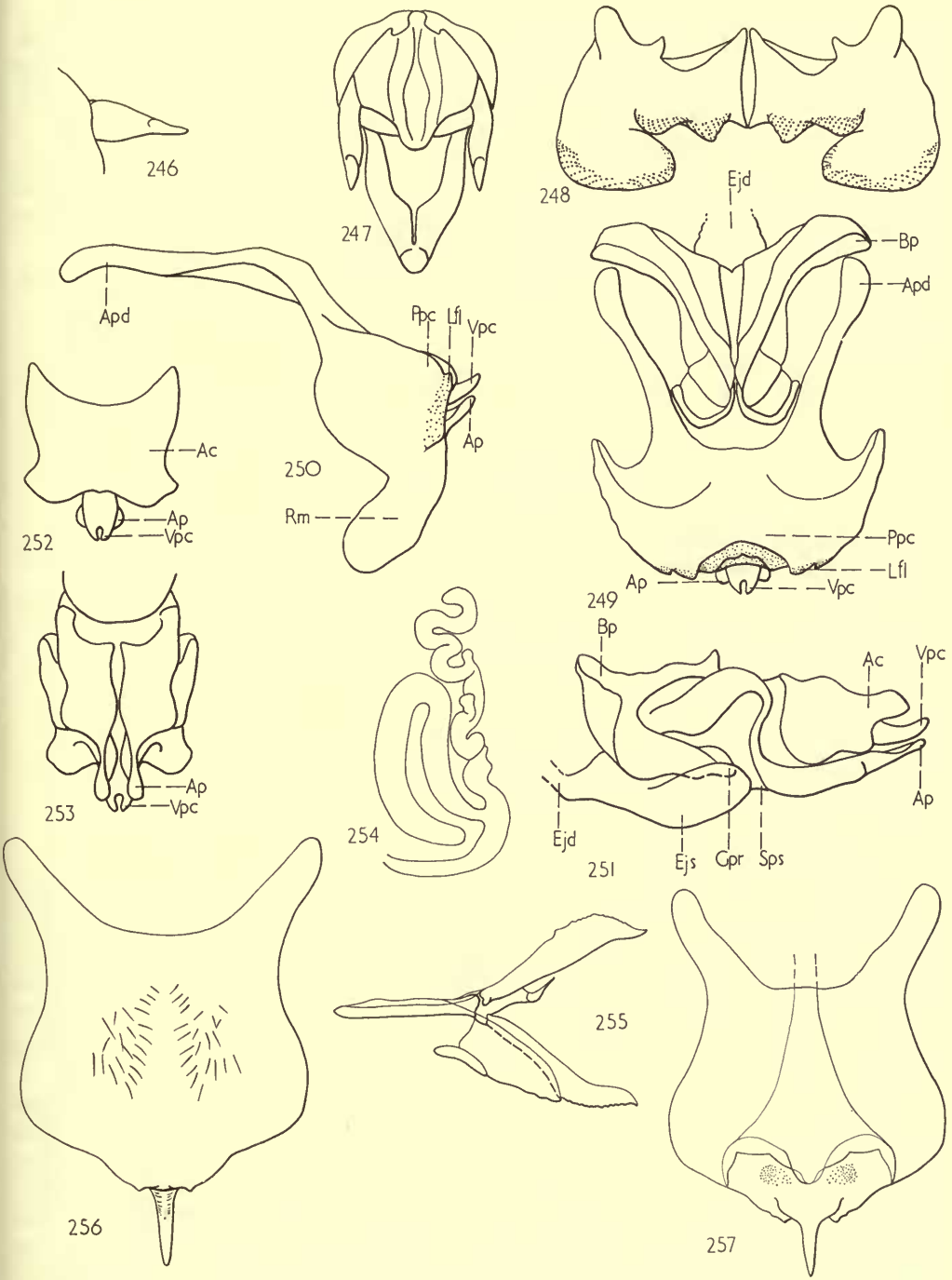


FIG. 245. *Oxya* spp., distribution map.



FIGS 246–257. *Oxya paravicina* Willemse, terminalia and genitalia; male, 246, cercus, lateral view (from dry specimen); 247, apex of abdomen, dorsal view (from dry specimen); 248 epiphallus; 249, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 250, cingulum, lateral view; 251, endophallus, lateral view, 252; apex of penis, dorsal view; 253, same, ventral view; female, 254, spermatheca; 255, ovipositor, lateral view; 256, subgenital plate, ventral view; 257, same, dorsal view.

Measurements (mm) – Length of body, ♂ 22·0–25·3, ♀ 31·5–34·1; pronotum, ♂ 4·8–5·7, ♀ 6·8–7·3; tegmen, ♂ 5·1–6·2, ♀ 8·0–9·4; hind femur, ♂ 13·1–14·3, ♀ 17·2–18·5; maximum width of hind femur, ♂ 2·7–3·1, ♀ 3·4–3·8; mean ratio of length of tegmen to pronotum (E/P) ♂ 1·07, ♀ 1·24; mean ratio of length of tegmen to hind femur (E/F), ♂ 0·41, ♀ 0·50; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·73, ♀ 4·89.

Discussion. *O. paravicina* Willemse is quite distinct from all other species in the genus and may be easily recognized by the almost micropterous condition of the tegmina and hind wings, the form of the hind margin of the ♂ 10th abdominal tergite and the two pairs of inner lophi of the epiphallus.

Distribution (Text-fig. 245). Country and months of capture, from 10 specimens examined.

India (North-east): July, October.

Oxya diminuta Walker, 1871

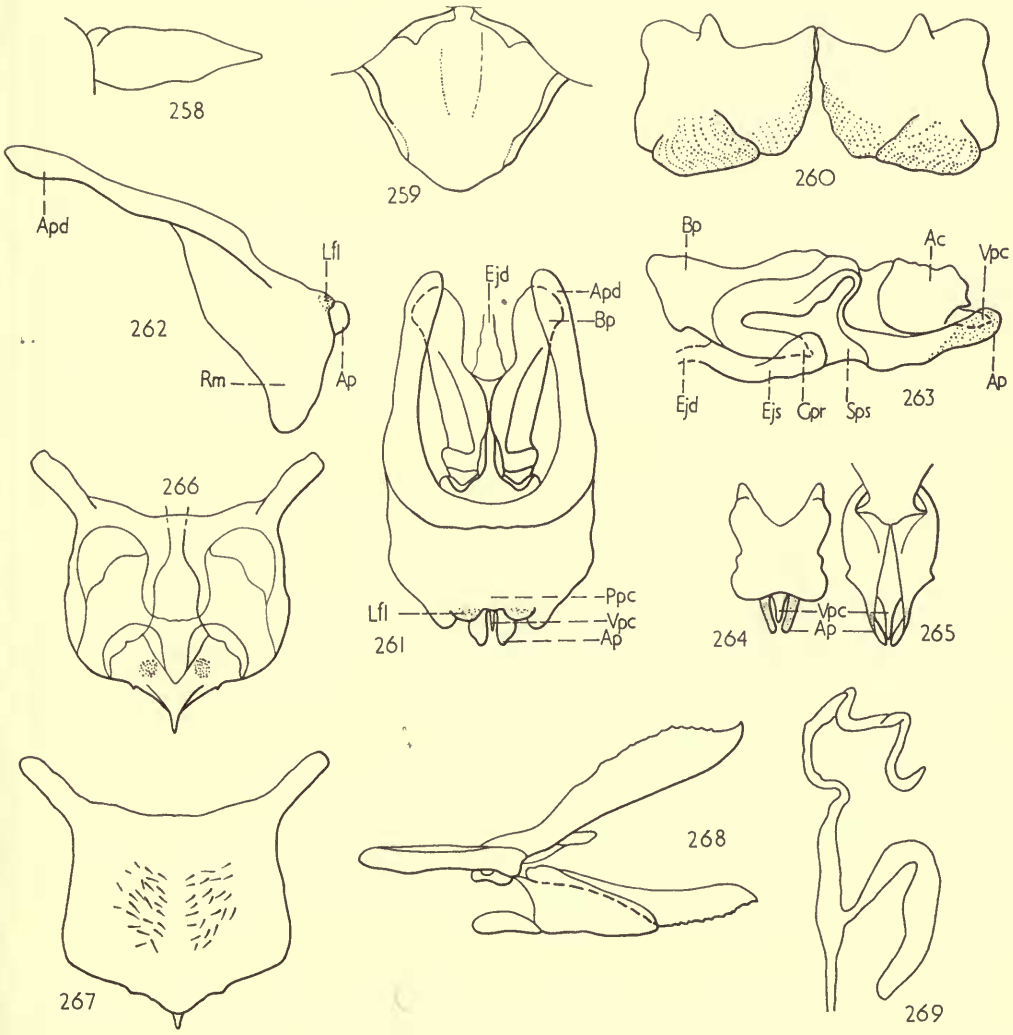
(Text-figs 245, 258–269)

Oxya diminuta Walker, 1871: 64. Holotype ♀ [not ♂ as stated by Walker], China: Yunan, (BMNH) [examined].
Oxya rufipes Brunner von Wattenwyl, 1893: 153. LECTOTYPE ♂, Cambodia (NM, Vienna), here designated [examined]. [Synonymized by Willemse, 1921: 42.]
[*Oxya intricata* (Stål); Brunner von Wattenwyl, 1893: 153, partim. Misidentification.]
Traulia diminuta (Walker) Kirby, 1910: 476.
Oxya rufipes Brunner von Wattenwyl; I. Bolivar, 1918: 16.
Oxya diminuta Walker; Willemse, 1925: 13, figs 1–3.
Oxya diminuta f. *macroptera* Willemse, 1925: 15; Willemse, 1955: 146.
Oxya rufipes Brunner von Wattenwyl; Fulmek, 1926: 2, 4.
Oxya diminuta Walker; Tinkham, 1940: 292.
Oxya diminuta Walker; Kalshoven and Van der Vecht, 1950: 108.
Oxya diminuta Walker; Willemse, 1955: 146.

Type-Data. In the BMNH there is a female bearing a British Museum type-label, and a label on which is written on one side, in F. Moore's handwriting, '*Oxya diminuta* Walk. W. Yunan (type)', and on the other side, in a different hand, the registration number '91 53', and in yet a third hand '80'. Below the specimen is the label 'Yunan' cut out from Walker's catalogue (1871). Walker's original description mentions only a male from 'Yunan, in Dr Anderson's collection'. Willemse (1925 and 1955) mentions the type of *O. diminuta* Walker as a male.

Dr John Anderson was the medical officer and naturalist on the 1867–8 expedition to W. Yunan (Anderson, 1871) and it seems that Walker described *O. diminuta* from a specimen in Dr Anderson's collection. Between 1870 and 1891 Anderson must have passed over his collection to F. Moore as the BMNH registration entry under 1891: 53 includes '17 types of Orthoptera and Neuroptera purchased from F. Moore' and the type of *O. diminuta* Walker appears to be one of these specimens. It seems therefore that Walker misidentified the sex of this specimen and his mistake was copied by Willemse.

Diagnosis. ♂. Integument more coarsely pitted and matt. Antenna about as long as combined lengths of head and pronotum, with 21–23 segments. Interocular distance slightly narrower than frontal ridge at median ocellus. Dorsum of pronotum flattened, parallel-sided. Tegmina normally abreviated and not extending to apex of abdomen, rarely fully developed. Posterior margin of 10th abdominal tergite (Text-fig. 259) with a pair of rectangular projections



Figs 258–269. *Oxya diminuta* Walker, terminalia and genitalia; male, 258, cercus, lateral view; 259, supra-anal plate, dorsal view; 260, epiphallus; 261, phallic complex, dorsal view, epiphallus and ectophallic membrane removed; 262, cingulum, lateral view; 263, endophallus, lateral view; 264, apex of penis, dorsal view; 265, same, ventral view; female, 266, subgenital plate, dorsal view; 267, same, ventral view; 268, ovipositor, lateral view; 269, spermatheca.

medially; supra-anal plate (Text-fig. 259) rounded triangular; cercus (Text-fig. 258) conical with subacute apex. Epiphallus (Text-fig. 260) with narrow bridge, with ancorae, with boot-shaped outer lophi and irregularly shaped inner lophi; rest of phallic complex as in Text-figs 261–265; posterior process of cingulum with a median posterior emargination; lateral fleshy lobes visible from above; valvular plate of cingulum narrow, forming a central rod-like structure apically; apical valves of penis short, laterally flattened and slightly twisted.

♀. Larger and more robust than ♂. Antenna shorter than combined lengths of head and pronotum. Interocular distance as wide as frontal ridge at median ocellus. Anterior margin of tegmen without spines. Spermatheca as in Text-fig. 269; valves ovipositor (Text-fig. 268) with tooth-like spines, posterior ventral basivalvular sclerite without spines on its inner ventral margin; ventral surface of subgenital plate (Text-fig. 267) flat or convex, posterior margin rounded triangular, without spines.

Coloration. Striking in that hind femur is either all green or yellow with diffuse black markings, and the hind tibia is completely bright red.

Measurements (mm) – Length of body, ♂ 15·6–18·3, ♀ 19·9–25·4; pronotum, ♂ 3·6–4·4, ♀ 4·6–5·6; tegmen, ♂ 7·1–10·2, ♀ 8·6–16·4; hind femur, ♂ 9·6–11·8, ♀ 11·9–14·3; maximum width of hind femur, ♂ 2·4–2·8, ♀ 2·8–3·5; mean ratio of length of tegmen to pronotum (E/P), ♂ 2·12, ♀ 2·16; mean ratio of length of tegmen to hind femur (E/F), ♂ 0·80, ♀ 0·84; mean ratio of length of hind femur to its maximum width (FL/FW), ♂ 4·11, ♀ 4·18.

Discussion. *Oxya diminuta* Walker is quite variable in size, general coloration and the relative length of the tegmina. It is quite distinct from all other species in the genus and may be easily identified by its bright red hind tibiae, abbreviated tegmina and matt integument.

Biological and economic references to this species may be found in Fulmek (1926), Tinkham (1940) and Kalshoven and Van der Vecht (1950).

Synonymy. Kirby (1910) transferred this species to the genus *Traulia* but Willemse (1921) recombined it with *Oxya* and, at the same time, placed *O. rufipes* Brunner von Wattenwyl into its synonymy. The latter species was described from several specimens of both sexes from Cambodia, Cochinchina, Penang and Sumatra. A male from this series labelled 'Coll. Br. v. W., Cambodia, S. Stevens. *Oxya rufipes* det. Br. v. W'. is selected as LECTOTYPE.

Brunner von Wattenwyl, in his discussion of *O. intricata* (Stål), mentions a variety with red legs from Cambodia. This specimen was described as *O. diminuta* f. *macroptera* by Willemse (1925). Although the usual tendency in this species is towards abbreviated tegmina, several specimens from various localities have been examined where the tegmina extend to at least the apex of the abdomen in the female and this character is thought to be of individual variability.

Distribution (Text-fig. 245). Countries and months of capture, from 201 specimens examined.

India (North-east): July, December; Burma: February, March, September; Andaman Is: February, August; China: March, November, December; Thailand: January to June, September, October; Laos: no dates; Cambodia: no dates; Vietnam: no dates; West Malaysia: all year round; Singapore: no dates; Sumatra: September through to January, March, April, June, July.

(In ANS, Philadelphia there are two males labelled 'Coonoor, S. India, 5,000', v.19.1923 (P. S. Nathan)'; this labelling is regarded as very doubtful.)

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Junior synonyms in italics

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